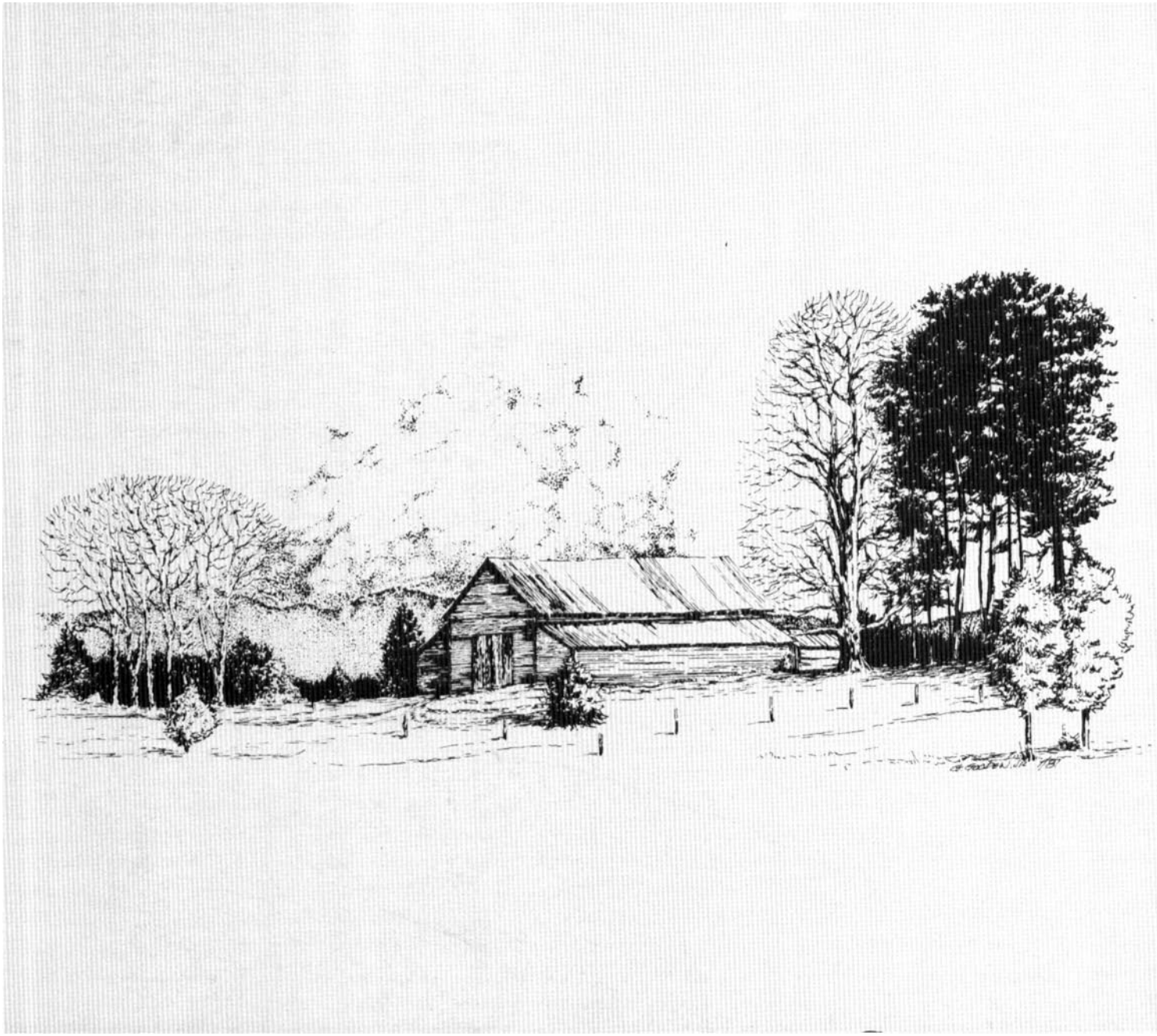
United States Department of Agriculture

Soil Conservation Service

In cooperation with
North Carolina Department of Natural Resources and Community Development,
North Carolina Agricultural Research Service,
North Carolina Agricultural Extension Service,
United States Department of Agriculture Forest Service, and
Caldwell County Board of Commissioners

Soil Survey of Caldwell County, North Carolina



How To Use This Soil Survey

General Soil Map

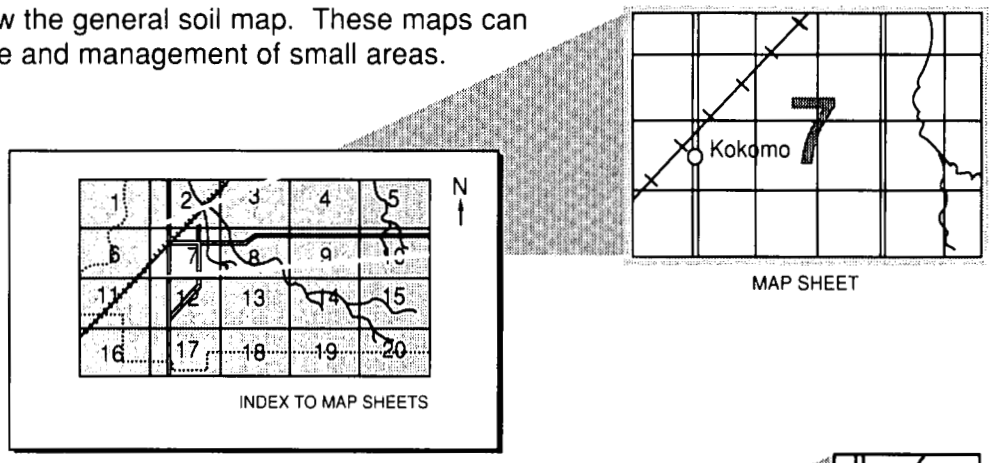
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

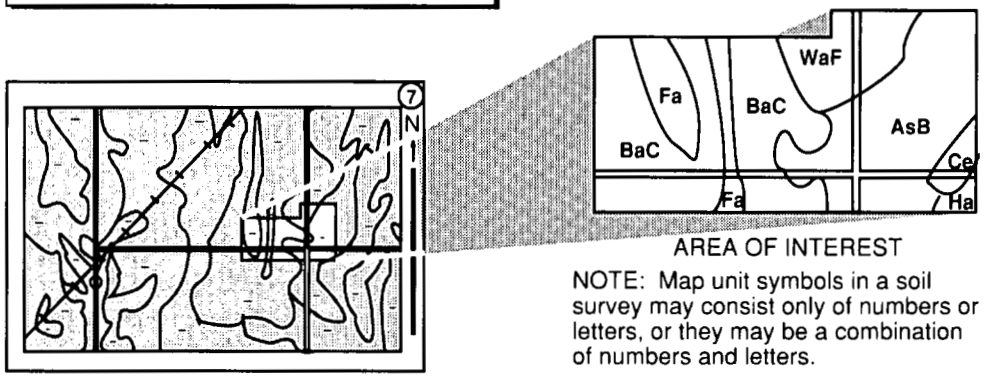
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the North Carolina Agricultural Research Service, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1982. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This soil survey was made cooperatively by the Soil Conservation Service, North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, United States Forest Service, and the Caldwell County Board of Commissioners. It is part of the technical assistance furnished to the Caldwell County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Caldwell County was published in 1918. This survey updates the first soil survey and provides additional information.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A typical farm setting in Caldwell County. (Artwork courtesy of Garland Gooden, Lenoir, North Carolina).

Contents

Index to map units iv
Summary of tables v
Foreword vii
General nature of the survey area 1
How this survey was made 2
Map unit composition 3
General soil map units 5
Detailed soil map units 9
Important farmland 31
Prime farmland 31
State and locally important farmland 31
Use and management of the soils 33
Crops and pasture 33
Woodland management and productivity 36
Recreation 40
Wildlife habitat 41
Engineering 42
Soil properties 47
Engineering index properties 47
Physical and chemical properties 48
Soil and water features 49
Engineering index test data 50
Classification of the soils 51
Soil series and their morphology 51
References 63
Glossary 65
Tables 73

Soil Series

Appling series 51
Ashe series 52
Buncombe series 52
Burton series 53
Cecil series 53
Chestnut series 54
Chewacla series 54
Congaree series 55
Davidson series 55
Dogue series 55
Edneyville series 56
Evard series 56
Hayesville series 57
Hibriten series 57
Masada series 58
Pacolet series 58
Potomac series 59
Rion series 59
Roanoke series 60
Saluda series 60
State series 60
Tate series 61
Wehadkee series 61

Issued July 1989

Index to map units

ApB—Appling sandy loam, 2 to 8 percent slopes 9
ApD—Appling sandy loam, 8 to 15 percent slopes.... 10
AsF—Ashe stony sandy loam, 25 to 40 percent slopes..... 10
AsG—Ashe stony sandy loam, 40 to 80 percent slopes..... 11
Bn—Buncombe loamy sand, frequently flooded..... 11
BtF—Burton stony loam, 25 to 40 percent slopes..... 11
CeB2—Cecil sandy loam, 2 to 8 percent slopes, eroded..... 12
CeD2—Cecil sandy loam, 8 to 15 percent slopes, eroded..... 12
CfB2—Cecil-Urban land complex, 2 to 8 percent slopes, eroded 13
CfD2—Cecil-Urban land complex, 8 to 15 percent slopes, eroded 14
ChG—Chestnut gravelly loam, 50 to 80 percent slopes..... 14
CKE—Chestnut and Edneyville soils, 15 to 25 percent slopes 15
CKF—Chestnut and Edneyville soils, 25 to 50 percent slopes 15
Cm—Chewacla loam, occasionally flooded..... 16
Co—Congaree fine sandy loam, occasionally flooded..... 16
DnB—Davidson clay loam, 2 to 8 percent slopes 17
DnD—Davidson clay loam, 8 to 15 percent slopes.... 19
DoB—Dogue fine sandy loam, 2 to 8 percent slopes 19
EaE—Evard fine sandy loam, 15 to 25 percent slopes..... 20
EaF—Evard fine sandy loam, 25 to 50 percent slopes..... 20
ESF—Evard and Saluda fine sandy loams, 25 to 60 percent slopes 20
HaD—Hayesville fine sandy loam, 8 to 15 percent slopes..... 21
HaE—Hayesville fine sandy loam, 15 to 25 percent slopes..... 21
HbD—Hibriten very cobbly sandy loam, 8 to 15 percent slopes 22
HbF—Hibriten very cobbly sandy loam, 15 to 60 percent slopes 22
MaB—Masada loam, 2 to 8 percent slopes 23
MaD—Masada loam, 8 to 15 percent slopes..... 23
PaE—Pacolet fine sandy loam, 15 to 25 percent slopes..... 23
PaF—Pacolet fine sandy loam, 25 to 40 percent slopes..... 24
Po—Potomac very cobbly loamy sand, frequently flooded..... 24
Pt—Pits, Quarries..... 25
RnE—Rion sandy loam, 15 to 25 percent slopes..... 25
RnF—Rion sandy loam, 25 to 40 percent slopes..... 25
Ro—Roanoke loam..... 26
RSF—Rock outcrop-Ashe complex, 25 to 80 percent slopes 26
SeB—State loam, 2 to 8 percent slopes..... 26
TaB—Tate fine sandy loam, 2 to 8 percent slopes.... 27
TaE—Tate fine sandy loam, 8 to 25 percent slopes.. 27
UaB—Urban land-Arents complex, occasionally flooded..... 27
UmC—Urban land-Masada complex, 2 to 15 percent slopes..... 28
Wk—Wehadkee loam, frequently flooded..... 29

Summary of Tables

Temperature and precipitation (table 1) 74

Freeze dates in spring and fall (table 2) 75
Probability. Temperature.

Growing season (table 3) 75

Acreage and proportionate extent of the soils (table 4) 76
Acres. Percent.

Land capability classes and yields per acre of crops and pasture (table 5) 77
Land capability. Corn. Tobacco. Wheat. Soybeans. Grass-Legume hay. Pasture.

Woodland management and productivity (table 6) 80
Ordination symbol. Management concerns. Potential productivity. Trees to plant.

Recreational development (table 7) 85
Camp areas. Picnic areas. Playgrounds. Paths and trails. Golf fairways.

Wildlife habitat (table 8) 88
Potential for habitat elements. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.

Wildlife and wildlife habitat by species (table 9) 91
Species. Population rating. Existing habitat. Habitat trend rating. Habitat potential.

Building site development (table 10) 92
Shallow excavations. Dwellings without basements. Dwellings with basements. Small commercial buildings. Local roads and streets. Lawns and landscaping.

Sanitary facilities (table 11) 95
Septic tank absorption fields. Sewage lagoon areas. Trench sanitary landfill. Area sanitary landfill. Daily cover for landfill.

Construction materials (table 12) 98
Roadfill. Sand. Gravel. Topsoil.

Water management (table 13) 101
Limitations for—Pond reservoir areas; Embankments, dikes, and levees; Aquifer-fed excavated ponds. Features affecting—Drainage, Terraces and diversions, Grassed waterways.

Engineering index properties (table 14) 104
Depth. USDA texture. Classification—Unified, AASHTO. Fragments greater than 3 inches. Percentage passing sieve—4, 10, 40, 200. Liquid limit. Plasticity index.

Physical and chemical properties of the soils (table 15) 110
Depth. Clay. Moist bulk density. Permeability. Available water capacity. Soil reaction. Shrink-swell potential. Erosion factors. Organic matter.

Soil and water features (table 16)..... 114
Hydrologic group. Flooding. High water table. Bedrock. Risk of corrosion.

Engineering index test data (table 17) 116
Classification. Grain-size distribution. Liquid limit. Plasticity index. Moisture density.

Classification of the soils (table 18)..... 117
Family or higher taxonomic class.

Foreword

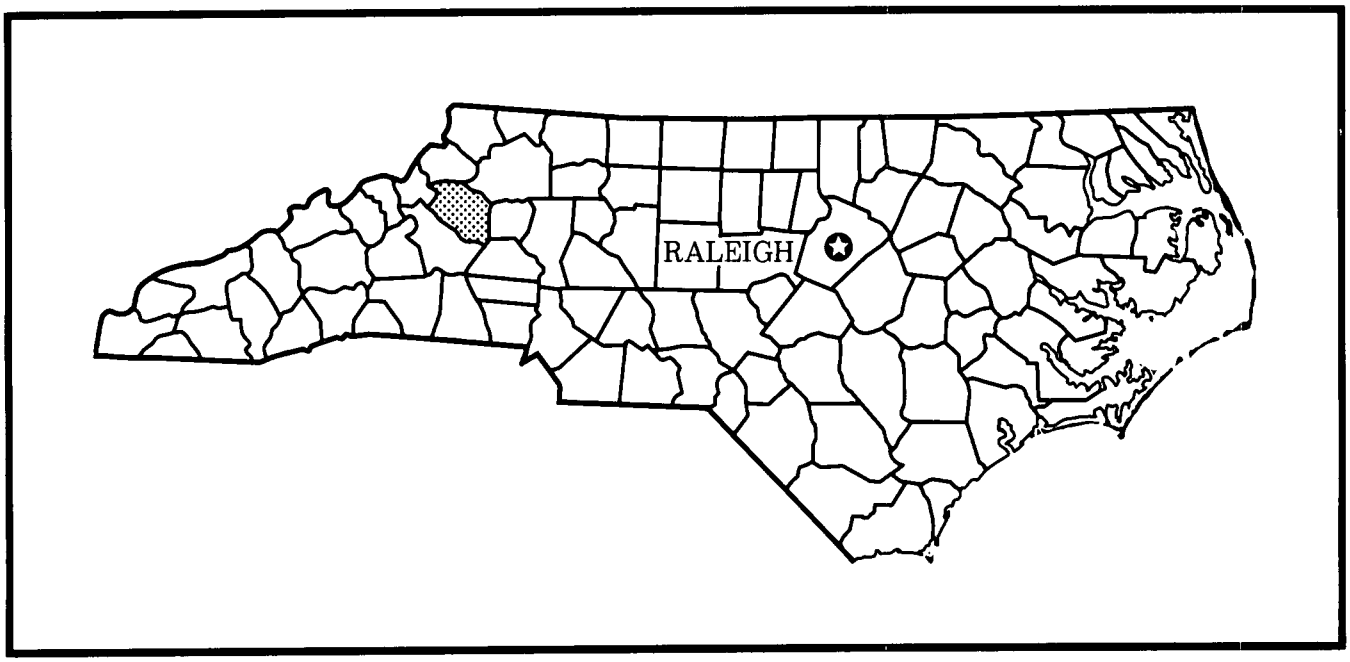
This soil survey contains information that can be used in land-planning programs in Caldwell County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

Bobbye J. Jones
State Conservationist
Soil Conservation Service



Location of Caldwell County in North Carolina.

Soil Survey of Caldwell County, North Carolina

By Michael Ortosky, Jr., Soil Conservation Service

Soils surveyed by Michael Ortosky, Jr., Edward O. Brewer, Robert M. Brown, and J.H. Ware, Jr., Soil Conservation Service, and Joseph A. Hinton, North Carolina Department of Natural Resources and Community Development

United States Department of Agriculture, Soil Conservation Service
In cooperation with
North Carolina Department of Natural Resources and Community Development;
North Carolina Agricultural Research Service;
North Carolina Agricultural Extension Service;
United States Department of Agriculture, Forest Service;
and the Caldwell County Board of Commissioners

General Nature of the Survey Area

CALDWELL COUNTY is in the northwestern part of North Carolina. It is bounded on the northwest by the Blue Ridge Mountains and on the south by the Catawba River. Most of the county is drained to the south by several tributaries of the Catawba River—Wilson Creek, Mulberry Creek, Johns River, Lower Creek, Gunpowder Creek, and the Upper Little and Middle Little Rivers. The northeast corner of the county is drained to the northeast by the headwaters of the Yadkin River and Buffalo Creek. Caldwell County lies within two physiographic regions. The northern part of the county is in the Blue Ridge region, and the southern part is in the Southern Piedmont region. Elevation ranges from 5,920 feet on the northwest corner near Grandfather Mountain to 920 feet on the southeast corner where the Catawba River, which forms Lake Rhodhiss and Lake Hickory, leaves the county. The range in elevation in Caldwell County is wider than in any other county in North Carolina. The total area in Caldwell County is 301,549 acres, including about 2,125 acres of water.

The northwestern part of the county is mainly made up of the steep, deeply dissected eastern flanks of the Blue Ridge Mountains. The Brushy Mountain chain comes into the county from the east and runs south of and parallel to North Carolina Highway 18. These mountainous areas are generally wooded, and the soils tend to be loamy and are stony in places. On very steep slopes and narrow ridges, the soils may be droughty. Farming in these areas has been generally limited to the small valleys and broader ridges.

The central and southeastern parts of the county are mainly upland piedmont landscapes. Soils tend to be red clays that generally are deeper than the soils in the mountainous areas. The broad, rolling ridges of this area allow a wider range of land uses.

Some of the county's most productive agricultural soils are on bottom land in the larger stream valleys. The major areas are along the Yadkin River in the Happy Valley section, Lower Creek, Mulberry Creek, Johns River Valley, and around the Globe section.

History

Hunters and gatherers are believed to have been the first inhabitants of the area. Eventually, the native inhabitants brought agriculture to the valleys. At the time of early trappers and settlers, Cherokee Indians lived in the mountains, and the Catawba Indians inhabited the lower areas near the Catawba River *(1)*.

In 1752, the area was surveyed by Bishop Angustus Spangenberg, who was looking for a site for a Moravian colony. By 1790, about 2,700 people lived in what is now Caldwell County. By 1825, a settlement was at Tuckers Barn near Fort Grider, which eventually became Lenoir,

the county seat. It was named for William Lenoir, a Revolutionary War hero. In 1841, Caldwell County was formed from what had been parts of Burke and Wilkes counties. The county was named for Joseph Caldwell, the first president of the University of North Carolina *(14)*.

In 1878, there were grain mills, sawmills, furniture shops, tanneries, gold mines, and small farms. Early in the 1900's, the county's economy centered mainly around forest products, tobacco, dairies, poultry, and livestock. In the mid-1900's, a general shift to industry, mainly furniture production, occured around Lenoir *(14)*.

Caldwell County is a mixture of remote wooded mountains, open piedmond farmland, and urban-industrial areas. Lenoir and smaller surrounding towns have become the major industrial area of western North Carolina. Population of the county is presently about 68,000. The area is served by one major railway and several motor freight lines. Air transportation is available at the Morganton-Lenoir Airport.

Farming is still a viable industry in the county. Major crops include tobacco, grain, silage, and hay. Beef cattle and dairying are the major livestock enterprises. Forest products also provide an income to many landowners.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Caldwell County is hot and generally humid in summer in moist maritime air. Winter is moderately cold but short because the mountains to the west protect the area against many cold waves. Precipitation is evenly distributed throughout the year and is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lenoir, North Carolina, in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 41 degrees F, and the average daily minimum temperature is 29 degrees. The lowest temperature on record, which occurred at Lenoir on January 9, 1970, is -5 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Lenoir on July 14, 1954, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 49 inches. Of this, 27 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 5.01 inches at Lenoir on November 7, 1977. Thunderstorms occur on about 50 days each year, and most occur in summer.

The average seasonal snowfall is 8 inches. The greatest snow depth at any one time during the period of record was 11 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in winter.

How This Survey Was Made

This survey was made to provide information about the soils in Caldwell County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another and their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship,

are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their potential for major land uses.

1. Cecil-Pacolet-Rion

Gently sloping to steep, well drained soils that have a clayey or loamy subsoil; formed in residuum from igneous and metamorphic rock

The soils of this map unit are throughout the more rolling piedmont section of the county on broad ridges and side slopes. This map unit makes up about 37 percent of Caldwell County. It is about 40 percent Cecil soils, 40 percent Pacolet soils, 6 percent Rion soils, and 14 percent soils of minor extent.

The Cecil soils are gently sloping to strongly sloping and they are on the ridges. The surface layer is strong brown sandy loam, and the subsoil is red clay.

The Pacolet soils are moderately steep or steep and they are on the side slopes. The surface layer is reddish brown fine sandy loam, and the subsoil is red clay.

The Rion soils are moderately steep or steep and they are on the side slopes. The surface layer is dark grayish brown sandy loam, and the subsoil is strong brown sandy clay loam.

Of minor extent are the Masada and Chewacla soils along small drainageways.

The soils in the less sloping areas of this map unit are mainly used as cropland and pasture. The soils in the steeper areas are forested. Erosion is a hazard to farming.

The Cecil soils are used for urban development. The Pacolet and Rion soils generally are not used for urban development because of steepness of slope.

2. Cecil-Pacolet-Appling

Gently sloping to steep, well drained soils that have a clayey subsoil; formed in residuum from igneous and metamorphic rock

The soils of this map unit are in the southeastern piedmont section of the county on broad ridges and short side slopes. This map unit makes up about 5 percent of Caldwell County. It is about 40 percent Cecil soils, 30 percent Pacolet soils, 11 percent Appling soils, and 19 percent soils of minor extent.

The Cecil soils are gently sloping to strongly sloping and they are on the convex ridges. The surface layer is strong brown sandy loam, and the subsoil is red clay.

The Pacolet soils are moderately steep or steep and they are on the side slopes. The surface layer is reddish brown fine sandy loam, and the subsoil is red clay.

The Appling soils are gently sloping to strongly sloping and they are on broad, smooth ridges and side slopes. The surface layer is brown sandy loam, and the subsoil is strong brown clay.

Of minor extent are the Masada and Chewacla soils along small drainageways.

The soils of this map unit are mostly used as cropland or pasture. Soils in some of the steeper areas are forested. In some areas, the soils are used for urban development. Steepness of slope is the main limitation for most uses, and erosion is a hazard.

3. Hibriten-Pacolet

Moderately sloping to very steep, well drained soils that have a loamy or clayey subsoil; formed in residuum from igneous and metamorphic rock

The soils of this map unit are on the piedmont just south of and generally parallel to North Carolina Highway 90 on the east side of the county and around Cajah, Rippetoe, and Bradford Mountains in the south-central part of the county. This map unit makes up about 4 percent of Caldwell County. It is about 70 percent Hibriten soils, 20 percent Pacolet soils, and 10 percent soils of minor extent.

The Hibriten soils are moderately sloping to very steep and they are on narrow ridges and side slopes. The

surface layer is dark grayish brown very cobbly sandy loam, and the subsoil is yellowish red very cobbly sandy clay loam.

The Pacolet soils are moderately steep or steep and they are on some ridges and side slopes. The surface layer is reddish brown fine sandy loam, and the subsoil is red clay.

Of minor extent are the Rion soils on side slopes.

Nearly all of the soils of this map unit are used as woodland; they are not used for farming or urban development. Steepness of slope, stoniness, and droughtiness are the main limitations for most uses. Tree growth is generally poor, and commercial forestry may not be feasible in most areas of this map unit.

4. Chewacla-Masada-Congaree

Nearly level to strongly sloping, somewhat poorly drained to well drained soils that have a loamy or clayey subsoil or loamy underlying material; formed in recent and old alluvium

The soils of this map unit are on flood plains and terraces along most of the major streams and rivers in the county. This map unit makes up about 7 percent of Caldwell County. It is about 30 percent Chewacla soils, 30 percent Masada soils, 20 percent Congaree soils, and 20 percent soils of minor extent.

The Chewacla soils are nearly level, somewhat poorly drained, and they are on flood plains. The surface layer is brown loam, and the subsoil is yellowish brown loam.

The Masada soils are gently sloping to strongly sloping, well drained, and they are on stream terraces. The surface layer is brown loam, and the subsoil is yellowish red and strong brown clay loam or dark reddish brown clay loam, red clay, and red sandy clay loam.

The Congaree soils are nearly level, well drained or moderately well drained, and they are on flood plains. The surface layer is brown fine sandy loam, and the underlying material is dark yellowish brown fine sandy loam in the upper part and mottled dark yellowish brown, yellowish brown, light brownish gray, and dark brown fine sandy loam in the lower part.

Of minor extent are the State, Dogue, Roanoke, and Wehadkee soils. The State, Dogue, and Roanoke soils are on low terraces. The Wehadkee soils are poorly drained and are on low flood plains.

Nearly all of the soils of this map unit are used as cropland or pasture. The Masada soils are often used for urban development. Wetness is the main limitation for most uses, and flooding is a hazard.

5. Evard-Hayesville-Saluda

Moderately sloping to very steep, well drained soils that have a clayey or loamy subsoil; formed in residuum from metamorphic rock

This map unit is in the lower mountain areas, and it makes up about 20 percent of Caldwell County. It is about 60 percent Evard soils, 7 percent Hayesville soils, 5 percent Saluda soils, and about 28 percent soils of minor extent.

The Evard soils are moderately steep to very steep and they are on the narrow ridges and side slopes. The surface layer is dark brown fine sandy loam, and the subsoil is yellowish red clay loam.

The Hayesville soils are moderately sloping to moderately steep and they are on the broader ridges. The surface layer is yellowish brown fine sandy loam, and the subsoil is red clay.

The Saluda soils are steep or very steep and they are on the broken, irregular parts of the landscape. The surface layer is brown fine sandy loam, and the subsoil is yellowish red sandy clay loam.

Of minor extent are the Chestnut and Edneyville soils on the uplands and the Tate and Chewacla soils along small drainageways.

Some soils on broad ridges and side slopes within this map unit are used as pasture or for residential development. Most areas are forested. Steepness of slope and depth to bedrock are the main limitations for most uses, and erosion is a hazard.

6. Ashe

Steep or very steep, somewhat excessively drained soils that have a loamy subsoil; formed in residuum from granite gneiss

This map unit is near the Wilson Creek Gorge area in the western part of the county. It makes up less than 1 percent of Caldwell County. It is about 80 percent Ashe soils and 20 percent soils of minor extent.

The Ashe soils are steep or very steep and they are on narrow ridges and side slopes. The surface layer is brown stony sandy loam, and the subsoil is yellowish brown gravelly sandy loam.

Of minor extent are the Chestnut and Edneyville soils on ridges and side slopes. Rock outcrops are in this map unit.

All areas of this map unit are forested, and tree growth is poor for commercial timber production. Steepness of slope, stoniness, and depth to bedrock are the main limitations to most uses, and erosion is a hazard.

7. Burton

Steep, well drained soils that have a loamy subsoil; formed in residuum from quartzite

This map unit is in the northwestern corner of the county at an elevation generally above 4,000 feet on the slopes of Grandfather Mountain. The map unit makes up less than 1 percent of Caldwell County. It is about 80 percent Burton soils and 20 percent soils of minor extent.

The Burton soils are steep and they are on ridges and side slopes. The surface layer is very dark grayish brown

stony loam, and the subsoil is brown and yellowish brown cobbly loam.

Of minor extent are the Chestnut and Edneyville soils, which are intermingled with the Burton soils.

All areas of this map unit are forested. Steepness of slope, stoniness, depth to bedrock, and climate are the main limitations to most uses, and erosion is a hazard.

8. Chestnut-Edneyville

Moderately steep to very steep, well drained soils that have a loamy subsoil; formed in residuum from metamorphic rock

This map unit is in the northwestern part of the county throughout the higher, steeper mountain areas. It makes up about 26 percent of Caldwell County. The map unit is about 60 percent Chestnut soils, 20 percent Edneyville soils, and 20 percent soils of minor extent.

The Chestnut soils are moderately steep to very steep and they are on narrow ridges and side slopes. The surface layer is dark yellowish brown gravelly loam, and the subsoil is yellowish brown gravelly loam.

The Edneyville soils are moderately steep to very steep and they are on broad ridges and toe slopes. The surface layer is very dark grayish brown loam, and the subsoil is yellowish brown loam.

Of minor extent are the Evard soils on upland side slopes and the Tate and Chewacla soils along small drainageways.

Most areas of this map unit are forested. Some soils on broad ridgetops and smooth side slopes are used as pasture or for residential sites. Steepness of slope is the main limitation for most uses, and erosion is a hazard.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in Caldwell County. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Important or commonly occurring plants are listed by their recognized common plant names *(10, 13)* in each map unit. Local plant names are given in parentheses following the common names if they differ.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hibriten very cobbly sandy loam, 8 to 15 percent slopes, is one phase in the Hibriten series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Cecil-Urban land complex, 2 to 8 percent slopes, eroded, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Chestnut and Edneyville soils, 15 to 25 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, Quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

ApB—Appling sandy loam, 2 to 8 percent slopes. This soil is well drained. It is on broad, smooth ridges of the Piedmont uplands in the southeastern part of the county. Areas of this soil are irregular in shape and they range from 5 to 80 acres.

Typically, the surface layer is brown sandy loam 9 inches thick. The subsoil to a depth of 53 inches is strong brown sandy clay loam in the upper part, strong brown clay in the middle part, and yellowish red sandy clay loam in the lower part. The substratum to a depth of 80 inches is reddish brown saprolite that crushes to sandy loam.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Appling soil in mapping are small, intermingled areas of Cecil, Pacolet, and Rion soils. Also included are some small areas of Appling soils that have a gravelly surface layer or are eroded and have a sandy clay loam surface layer. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is used for row crops. Erosion is a hazard, but conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion. Small acreages are in hay or pasture.

In forested areas, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, sumac, poison ivy, Virginia creeper, sassafras, American holly, greenbrier, grape, switchcane, and red maple. This soil has no significant limitation for use as woodland.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability is a limitation for septic tank absorption fields. This limitation generally is overcome by enlarging the field. This soil has no major limitations for most recreational uses.

This Appling soil is in capability subclass IIe. The woodland ordination symbol is 8A.

ApD—Appling sandy loam, 8 to 15 percent slopes. This soil is well drained. It is on side slopes of the Piedmont uplands in the southeastern part of the county. Areas of this soil are irregular in shape and they generally range from 10 to 50 acres.

Typically, the surface layer is sandy loam 9 inches thick. It is grayish brown in the upper part and yellowish brown in the lower part. The subsoil to a depth of about 43 inches is strong brown sandy clay loam in the upper part, yellowish red clay in the middle part, and in the lower part, it is yellowish red sandy clay loam that has reddish yellow mottles. The substratum to a depth of 60 inches is multicolored saprolite that crushes to sandy loam.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Appling soil in mapping are small, intermingled areas of Cecil, Pacolet, and Rion soils. Also included are some small areas of Appling soils that have a gravelly surface layer or are eroded and have a sandy clay loam surface layer. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is used for row crops. Erosion is a hazard, but conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, stripcropping, and grassed waterways help control runoff and reduce erosion. Some acreages are in hay or pasture.

In areas where this soil is used as woodland, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, sumac, poison ivy, Virginia creeper, sassafras, American holly, greenbrier, grape, switchcane, and red maple. This soil has no significant limitation for use as woodland.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability and steepness of slope are limitations for septic tank absorption fields. These limitations generally can be overcome by enlarging the field and installing the lateral lines on the contour. This soil has no major limitations for most recreational uses.

This Appling soil is in capability subclass IVe. The woodland ordination symbol is 8A.

AsF—Ashe stony sandy loam, 25 to 40 percent slopes. This soil is somewhat excessively drained. It is on side slopes, mainly around the Wilson Creek Gorge area on the west side of the county. It is also on very narrow ridges throughout the northwestern part of the county. Areas of this soil are irregular in shape and they range from 10 to 100 acres.

Typically, the surface layer is brown stony sandy loam 7 inches thick. The subsoil to a depth of 17 inches is yellowish brown gravelly sandy loam. The substratum, to a depth of 24 inches, is yellowish brown saprolite that crushes to gravelly sandy loam. To a depth of 36 inches, the substratum is partly weathered granite gneiss that can be dug with equipment. The substratum is underlain by hard granite gneiss.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated areas. The permeability is moderately rapid, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout. Depth to hard bedrock ranges from 20 to 40 inches.

Included with this Ashe soil in mapping are small areas of Chestnut, Edneyville, and Saluda soils. The Chestnut and Edneyville soils are on the less steep side slopes and ridges. Saluda soils, rock outcrop, and boulders are intermingled throughout the map unit. The included soils, generally in areas of less than 5 acres, make up about 25 percent of this map unit.

This soil is not used for crops, pasture, urban, or recreational uses. Steepness of slope, depth to bedrock,

and droughtiness are the main limitations for the use and management of this soil.

This soil is used mostly as woodland. The dominant native trees are chestnut oak, scarlet oak, pitch pine, Virginia pine, Table Mountain pine, and eastern white pine. The understory plants are mainly blackjack oak, flowering dogwood, mountain laurel, rhododendron, turkey beard, and blueberry. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and tree growth generally is better. Erosion is a hazard. Steepness of slope, droughtiness, and stoniness are the main limitations for woodland use and management.

This Ashe soil is in capability subclass VIIs. The woodland ordination symbol is 11R.

AsG—Ashe stony sandy loam, 40 to 80 percent slopes. This soil is somewhat excessively drained. It is on mountain side slopes, mainly around the Wilson Creek Gorge area on the western side of the county. It is also on very narrow, high ridges throughout the northwestern part of the county. Areas of this soil are irregular in shape and they range from 50 to about 500 acres.

Typically, the surface layer is dark yellowish brown stony sandy loam about 4 inches thick. The subsoil to a depth of about 22 inches is yellowish brown gravelly sandy loam. It is underlain by hard granite gneiss.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated areas. The permeability is moderately rapid, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout. Depth to hard bedrock is 20 to 40 inches.

Included with this Ashe soil in mapping are small areas of Chestnut, Edneyville, and Saluda soils. The Chestnut and Edneyville soils are on the less steep side slopes and ridges. The Saluda soils are on upper side slopes and narrow ridges. Rock outcrop and boulders are intermingled throughout the map unit. The included soils, generally in areas of less than 5 acres, make up about 25 percent of this map unit.

This soil is not used for crops, pasture, urban development, or recreational uses. Steepness of slope, depth to bedrock, and droughtiness are the main limitations for the use and management of this soil.

This soil is used mostly as woodland. The dominant native trees are chestnut oak, scarlet oak, pitch pine, Virginia pine, Table Mountain pine, and eastern white pine. The understory plants are mainly blackjack oak, flowering dogwood, mountain laurel, rhododendron, turkey beard, and blueberry. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and tree growth generally is better. Erosion is a hazard, and steepness of slope, droughtiness, and stoniness are the main limitations for woodland use and management.

This Ashe soil is in capability subclass VIIs. The woodland ordination symbol is 11R.

Bn—Buncombe loamy sand, frequently flooded. This soil is nearly level and is excessively drained. It is on flood plains along the major streams. Areas of this soil generally are long, narrow bands adjacent to the streams and they range from 5 to about 50 acres.

Typically, the surface layer is brown loamy sand 10 inches thick. The underlying material to a depth of 80 inches is yellowish brown loamy sand in the upper part, very dark grayish brown fine sandy loam in the middle part, and brown sand in the lower part.

Surface runoff is slow, and the hazard of erosion is slight. The permeability is rapid, and the available water capacity is low. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. This soil is subject to frequent, very brief flooding.

Included with this Buncombe soil in mapping are small, intermingled areas of Congaree soils that are well drained. Also included are areas of the Chewacla soils that are somewhat poorly drained. These soils are in depressions. Some areas of soils are included that have a fine sandy loam surface layer. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

This soil is used mostly as pasture or hayland, although a few areas at higher elevations are used for row crops. Flooding is a hazard. Because of the sandy texture, droughtiness is a problem during dry periods. In some areas, organic matter is added to increase the available water capacity.

In a few areas, this soil is used as woodland. The dominant trees are sycamore, green ash, red maple, yellow poplar, and river birch. The understory plants include hazel alder (tag alder), black willow, switchcane, greenbrier, honeysuckle, poison ivy, boxelder, American hornbeam, and grape. Droughtiness is the main limitation for woodland use and management.

This soil is not used for building site development because of flooding. It is used for recreational facilities, although flooding is a hazard.

This Buncombe soil is in capability subclass Vw. The woodland ordination symbol is 6S.

BtF—Burton stony loam, 25 to 40 percent slopes. This soil is well drained and is on the side slopes of Grandfather Mountain. It is in the northwestern corner of the county at an elevation generally above 4,000 feet. This soil is in only one area, which is about 1,000 acres in size and is west of U.S. Highway 221.

Typically, the surface layer is 10 inches thick. It is very dark grayish brown stony loam in the upper part and dark brown stony sandy loam in the lower part. The subsoil to a depth of 30 inches is brown cobbly loam in

the upper part and yellowish brown cobbly loam in the lower part. The underlying bedrock is light colored fractured quartzite.

Because of the high altitude this soil is cooler than the other soils in the county. As a result, the organic matter content is high. The surface runoff is medium, and the hazard of erosion is moderate under forest cover. The permeability is moderately rapid, and the available water capacity is moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout. Depth to hard bedrock is 20 to 40 inches.

Included with this Burton soil in mapping are small areas of Edneyville, Ashe, and Tate soils. The Edneyville and Ashe soils are intermingled at the lower elevations. The Tate soils are in small depressions or drainageways. Also included are some areas of soils that are free of stones on the surface. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

This soil is used mostly as woodland. The dominant trees are red spruce, Fraser fir, Fraser magnolia, cucumbertree (mountain magnolia), yellow birch, and pin cherry. The understory plants include rhododendron, mountain laurel, and striped maple. Stoniness and steepness of slope are the main limitations for timber management.

This soil is not used for row crops, pasture, urban development, or recreational uses. Stoniness and steepness of slope are the main limitations.

This Burton soil is in capability subclass VIs. It is not assigned a woodland ordination symbol.

CeB2—Cecil sandy loam, 2 to 8 percent slopes, eroded. This soil is well drained and is on the broad, smooth ridges of the Piedmont uplands. Areas of this soil are irregular in shape and they generally range from 5 to 100 acres or more.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil to a depth of 52 inches is yellowish red clay loam in the upper part, red clay in the middle part, and yellowish red clay loam in the lower part. The substratum to a depth of 64 inches is yellowish red saprolite that crushes to fine sandy loam.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Cecil soil in mapping are small, intermingled areas of Appling and Pacolet soils. Also included are areas of Cecil soils that have a gravelly surface layer or a clay loam surface layer where erosion has been more intense. Some soils are included that have many flakes of mica in the lower part of the subsoil. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is used for row crops (fig. 1). Erosion, however, is a hazard. Conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion. In some areas, this soil is used for hay or pasture.

In areas where this soil is used as woodland, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, sumac, American holly, poison ivy, Virginia creeper, sassafras, greenbrier, grape, blueberry, switchcane, mountain laurel, and red maple. This soil has no significant limitations for woodland use.

Erosion is a hazard in areas developed for building sites, and erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field. This soil has no major limitations for recreational uses.

This Cecil soil is in capability subclass IIe. The woodland ordination symbol is 10A.

CeD2—Cecil sandy loam, 8 to 15 percent slopes, eroded. This soil is well drained and is on the broad, smooth ridges of the Piedmont uplands. Areas of this soil are irregular in shape and they generally range from 5 to 100 acres.

Typically, the surface layer is reddish brown sandy loam 4 inches thick. The subsoil to a depth of about 40 inches is red clay in the upper part and red clay loam in the lower part. The substratum to a depth of 62 inches is yellowish red saprolite that crushes to fine sandy loam.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Cecil soil in mapping are small intermingled areas of Appling and Pacolet soils and some areas of soils that have soft bedrock at a depth of 20 to 40 inches. Also included are areas of Cecil soils that have a gravelly surface layer or that have a clay loam surface layer where erosion has been more intense. Some soils are included that have many flakes of mica in the lower part of the subsoil. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is used for row crops. Erosion and steepness of slope are the main concerns in management. Conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed

Figure 1.—Cecil sandy loam, 2 to 8 percent slopes, eroded, is mainly used for row crops, such as tobacco.

waterways help control runoff and reduce erosion. In some areas, this soil is used for hay or pasture.

In areas where this soil is used as woodland, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, sumac, American holly, poison ivy, Virginia creeper, common trumpetcreeper, sassafras, greenbrier, grape, blueberry, switchcane, mountain laurel, and red maple. This soil has no significant limitations for use as woodland.

Steepness of slope and erosion are the main concerns in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field. Steepness of slope is the main limitation for recreational uses.

This Cecil soil is in capability subclass IVe. The woodland ordination symbol is 10A.

CfB2—Cecil-Urban land complex, 2 to 8 percent slopes, eroded. This map unit consists of Cecil soil and areas of Urban land mainly in or near the city of Lenoir, as well as other towns and small housing developments. The areas of this soil and Urban land are too intricately mixed to be mapped separately. The areas of this map unit are 10 to about 150 acres.

The undisturbed Cecil soil is well drained. It makes up about 60 percent, and Urban land about 30 percent of this map unit. Undisturbed soils or areas that have been altered as the result of cutting, filling, or both, make up the rest.

Typically, the surface layer of the Cecil soil is strong brown sandy loam about 6 inches thick. The subsoil to a depth of about 52 inches is yellowish red clay loam in the upper part, red clay in the middle part, and yellowish red clay loam in the lower part. The substratum to a depth of 64 inches is yellowish red saprolite that crushes to fine sandy loam.

Surface runoff on the undisturbed Cecil soil is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. The Cecil soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

The Urban land part of this map unit is covered with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, schools, churches, and apartment complexes.

Included with this complex in mapping are small, intermingled areas of Appling and Pacolet soils. Also included are areas of Cecil soils that have a gravelly surface layer or a clay loam surface layer, and some soils that have many flakes of mica in the lower part of the subsoil. The included soils make up about 10 percent of this map unit.

The Cecil soil is used for building sites, recreational facilities, gardens, and landscaped areas. Erosion is a hazard, and erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field.

This Cecil-Urban land complex is not assigned to a capability subclass, nor does it have a woodland ordination symbol.

CfD2—Cecil-Urban land complex, 8 to 15 percent slopes, eroded. This map unit consists of Cecil soil and areas of Urban land mainly in or near the city of Lenoir, as well as other towns and small housing developments. The areas of this soil and Urban land are too intricately mixed to be mapped separately. The areas of this map unit are 10 to about 150 acres.

The undisturbed Cecil soil is well drained. It makes up about 60 percent, and Urban land about 30 percent of this map unit. Undisturbed soils or areas that have been altered as the result of cutting, filling, or both, make up the rest.

Typically, the surface layer of the Cecil soil is reddish brown sandy loam about 4 inches thick. The subsoil to a depth of about 40 inches is red clay in the upper part and red clay loam in the lower part. The substratum to a depth of 62 inches is yellowish red saprolite that crushes to fine sandy loam.

Surface runoff is medium on the undisturbed Cecil soil, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. The Cecil soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

The Urban land part of this map unit is covered with houses, paved streets, parking lots, driveways, small shopping centers, industrial buildings, schools, churches, and apartment complexes.

Included with this complex in mapping are small, intermingled areas of Appling and Pacolet soils. Also included are areas of Cecil soils that have a gravelly surface layer or a clay loam surface layer, and some soils that have many flakes of mica in the lower part of the subsoil. The included soils make up about 10 percent of this map unit.

The Cecil soil is used for building sites, recreational facilities, gardens, and landscaped areas. Steepness of slope is the main limitation, and erosion is a hazard. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field.

This Cecil-Urban land complex has not been assigned to a capability subclass, nor does it have a woodland ordination symbol.

ChG—Chestnut gravelly loam, 50 to 80 percent slopes. This soil is well drained and is on side slopes in the northwestern part of the county. Areas of this soil are irregular in shape and they range from 10 to several thousand acres.

Typically, the surface layer is dark yellowish brown gravelly loam about 6 inches thick. The subsoil to a depth of 30 inches is yellowish brown gravelly loam. The substratum to a depth of 72 inches is multicolored, partly weathered granite gneiss that can be dug with equipment. Hard granite gneiss is below the substratum.

Surface runoff is rapid, and erosion is a very severe hazard in unvegetated areas. The permeability is moderately rapid, and the available water capacity is moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout. Soft bedrock is at a depth of 20 to 40 inches, and hard bedrock is at a depth of more than 40 inches.

Included with this Chestnut soil in mapping are small areas of Edneyville, Ashe, and Saluda soils. Edneyville soils are on toe slopes and the less steep parts of the map unit. Ashe and Saluda soils are on the steeper, convex, upper slopes. Small areas of rock outcrop are included and are shown on the map with a special symbol. Also included are some areas of Chestnut soils that have a stony surface layer. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used as woodland. The dominant trees are northern red oak, white oak, scarlet oak, black oak, chestnut oak, yellow poplar, yellow birch, sweet birch, eastern white pine, shortleaf pine, Virginia pine, and pitch pine. The understory plants include rhododendron, mountain laurel, red maple, flowering dogwood, sourwood, and blackgum. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and tree growth is better. Yellow-poplar is often on these landscapes. On some of the very narrow ridgetops, the soil tends to be droughty, and pitch pine, Table Mountain pine, Virginia pine, chestnut oak, and scarlet oak are more abundant. Trees on exposed ridgetops above 3,500 feet are generally stunted by wind and cold temperature. Steepness of slope and shallow soil depth are the main limitations for woodland use and management. Specialized logging practices, such as cable logging, reduce the potential for erosion during harvesting.

Conservation practices are needed to control erosion along logging access roads.

This soil generally is not used for crops, building site development, or recreational facilities because of steepness of slope.

This Chestnut soil is in capability subclass VIIe. The woodland ordination symbol is 11R.

CKE—Chestnut and Edneyville soils, 15 to 25 percent slopes. This map unit consists of the Chestnut and Edneyville soils on ridges and side slopes in the northwestern part of the county. These soils are well drained. Areas of this map unit are narrow and generally follow ridgetop patterns. They range from 10 to about 200 acres. These soils were not mapped separately because of similar use and management and because of limited accessibility.

Chestnut soil makes up about 60 percent of this map unit. This soil is on side slopes and narrow ridgetops. Typically, the surface layer is brown fine sandy loam about 7 inches thick. The subsoil to a depth of 37 inches is yellowish brown fine sandy loam in the upper part, yellowish brown sandy clay loam in the middle part, and yellowish brown sandy loam in the lower part. The substratum to a depth of 60 inches is partly weathered granite gneiss that can be dug with equipment.

Edneyville soil makes up about 20 percent of this map unit. This soil is on the broader ridges and flatter side slopes. Typically, the surface layer is yellowish brown sandy loam 4 inches thick. The subsoil to a depth of about 30 inches is yellowish brown loam in the upper part and yellowish brown sandy clay loam in the lower part. The substratum to a depth of 60 inches is multicolored saprolite that crushes to fine sandy loam. The substratum is underlain by partly weathered granite gneiss that can be dug with equipment.

Surface runoff on these soils is rapid, and the hazard of erosion is severe in unvegetated, exposed areas. The Chestnut soil has moderately rapid permeability, and the Edneyville soil has moderate permeability. The available water capacity for both soils is moderate, and the shrink-swell potential is low. These soils range from very strongly acid to medium acid throughout. Depth to soft bedrock is 20 to 40 inches below the surface of Chestnut soil, and hard bedrock is not within 40 inches. Depth to bedrock is not within 60 inches of the surface of Edneyville soil.

Included with these Chestnut and Edneyville soils in mapping are small, intermingled areas of Ashe, Saluda, and Evard soils. Also included are small areas of Tate soils in coves and along drainageways and some soils that are stony. A soil that has a thicker, more clayey subsoil is on some ridges. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, these soils are used as woodland. The dominant trees are northern red oak, white oak, scarlet oak, black oak, chestnut oak, yellow poplar, yellow birch, sweet birch, eastern white pine, shortleaf pine, Virginia pine, and pitch pine. The understory plants include rhododendron, mountain laurel, red maple, flowering dogwood, sourwood, and blackgum. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and tree growth is better. Yellow-poplar is common on these slopes. On some of the very narrow ridges, the soils tend to be droughty, and pitch pine, Table Mountain pine, Virginia pine, chestnut oak, and scarlet oak are more prevalent. Trees on exposed ridges above 3,500 feet are generally stunted by wind and cold temperature. Steepness of slope and soil depth are the main limitations for woodland use and management. Conservation practices are needed to control erosion along logging access roads.

These soils generally are not used as cropland because of steepness of slope. They are used occasionally for building site development and recreational facilities, particularly around the Blowing Rock area and along U.S. Highways 221 and 321 in the northern part of the county. In areas developed for building sites, steepness of slope and depth to bedrock are the main limitations. Erosion and sediment control practices are needed in unvegetated areas at construction sites.

The soils in this map unit are in capability subclass VIe. The woodland ordination symbol is 11R for the Chestnut soil and 12R for the Edneyville soil.

CKF—Chestnut and Edneyville soils, 25 to 50 percent slopes. This map unit consists of the Chestnut and Edneyville soils on narrow ridges and side slopes in the northwestern part of the county. These soils are well drained. Areas of this map unit are irregular in shape and they range from 10 to several thousand acres. These soils were not mapped separately because of similar use and management and because of limited accessibility.

Chestnut soil makes up about 60 percent of this map unit. This soil is on the steeper side slopes and very narrow ridgetops. Typically, the surface layer is dark yellowish brown sandy loam 6 inches thick. The subsoil to a depth of 30 inches is yellowish brown sandy loam. The substratum to a depth of 72 inches is partly weathered granite gneiss that can be dug with equipment. Hard granite gneiss is below the substratum.

Edneyville soil makes up about 20 percent of this map unit. This soil is on toe slopes and on the flatter slopes. Typically, the surface layer is 7 inches thick. It is very dark grayish brown loam in the upper part and dark yellowish brown loam in the lower part. The subsoil to a depth of about 38 inches is yellowish brown loam in the upper part and yellowish brown fine sandy loam in the lower part. Below the subsoil to a depth of 62 inches is yellowish brown saprolite that crushes to fine sandy loam.

Surface runoff on these soils is rapid, and the hazard of erosion is severe in unvegetated, exposed areas. The Chestnut soil has moderately rapid permeability, and the Edneyville soil has moderate permeability. The available water capacity of both soils is moderate, and the shrink-swell potential is low. These soils range from very strongly acid to medium acid throughout. Soft bedrock is 20 to 40 inches below the surface of Chestnut soil. Hard bedrock is not within 40 inches of the surface of Edneyville soil.

Included with these Chestnut and Edneyville soils in mapping are small, intermingled areas of Ashe, Saluda, and Evard soils. Also included are small areas of Tate soils in coves and along drainageways and some soils that are stony. A soil that has a thicker, more clayey subsoil is on some gentler slopes. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, these soils are used as woodland. The dominant trees are northern red oak, white oak, scarlet oak, black oak, chestnut oak, yellow poplar, yellow birch, sweet birch, white pine, shortleaf pine, Virginia pine, and pitch pine. The understory plants include rhododendron, mountain laurel, red maple, flowering dogwood, sourwood, and blackgum. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes generally tend to be cooler and moister, and tree growth is better. Yellow-poplar is common on these slopes. On some of the very narrow ridges, the soils tend to be droughty, and pitch pine, Table Mountain pine, Virginia pine, chestnut oak, and scarlet oak are more prevalent. Trees on exposed ridges above 3,500 feet generally are stunted by wind and cold temperature. Steepness of slope and soil depth are the main limitations for woodland use and management. Specialized logging practices, such as cable logging, reduce the potential for erosion in harvested areas. Conservation practices are needed to control erosion along logging access roads.

These soils generally are not used for crops, building site development, or recreational facilities because of steepness of slope.

The Chestnut soil is in capability subclass VIIe. The woodland ordination symbol is 11R. The Edneyville soil is in capability subclass VIe. The woodland ordination symbol is 12R.

Cm—Chewacla loam, occasionally flooded. This soil is nearly level and is somewhat poorly drained. It is on flood plains along streams throughout the county. Areas of this soil generally are in long, narrow bands adjacent to the streams and they range from 5 to about 100 acres.

Typically, the surface layer is brown loam 8 inches thick. The subsoil to a depth of 44 inches is yellowish brown loam in the upper part, and in the middle part, it is yellowish brown loam that has light brownish gray mottles. In the lower part, it is grayish brown loam that has yellowish brown and strong brown mottles. The substratum to a depth of 72 inches is grayish brown fine sandy loam in the upper part and mottled gray and brown coarse sand and gravel in the lower part.

Surface runoff is slow to ponded. The permeability is moderate, and the shrink-swell potential is low. This soil ranges from strongly acid to slightly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. The seasonal high water table is 0.5 foot to 1.5 feet below the surface. This soil is subject to occasional, brief flooding.

Included with this Chewacla soil in mapping are small, intermingled areas of Congaree and Wehadkee soils. Also included are a few areas of a clayey, somewhat poorly drained soil on slightly higher stream terraces, and areas of soils that have a thin, sandy surface layer as a result of recent flooding. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is used mostly for row crops, hay, or pasture (fig. 2). Seasonal wetness is the main limitation, and occasional flooding is a hazard. In most areas, the soil used for row crops has been drained.

In a few areas, this soil is used as woodland. In these forested areas, the dominant trees are sycamore, green ash, red maple, yellow poplar, river birch, and shortleaf pine. The understory plants include alders, black willow, switchcane, greenbrier, honeysuckle, poison ivy, boxelder, American hornbeam, and grape. Seasonal wetness and occasional flooding limit the use of equipment and are the main management concerns for woodland use and management.

This soil is not used for building site development or recreational facilities because of seasonal wetness and occasional flooding.

This Chewacla soil is in capability subclass IIIw. The woodland ordination symbol is 7W.

Co—Congaree fine sandy loam, occasionally flooded. This soil is nearly level and is well drained to moderately well drained. It is on flood plains along the major streams. Areas of this soil generally are in long, narrow bands adjacent to the streams and they range from 5 to about 100 acres.

Typically, the surface layer is brown fine sandy loam 9 inches thick. The underlying material to a depth of 40 inches is dark yellowish brown fine sandy loam. The next layer is mottled dark yellowish brown and yellowish brown loamy sand. Below the loamy sand is mottled dark yellowish brown, light brownish gray, and dark brown fine sandy loam. Below that to a depth of 84 inches is grayish brown loam.

Surface runoff is slow. The permeability is moderate, and the shrink-swell potential is low. This soil ranges from strongly acid to neutral throughout except where lime has been added. Depth to bedrock is more than 60

Figure 2.—Hay production is one of the main uses of Chewacla loam, occasionally flooded.

inches. The seasonal high water table is 2.5 to 4 feet below the surface. This soil is subject to occasional, brief flooding.

Included with this Congaree soil in mapping are small intermingled areas of Buncombe and State soils. Also included are areas of Chewacla, Dogue, Pacolet, and Rion soils. The Chewacla soils are somewhat poorly drained. These soils are in depressions. The Dogue soils are in higher areas of the flood plain. The Pacolet and Rion soils are in the higher landscape positions adjacent to the uplands. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is cleared and is used for row crops or pasture (fig. 3). Occasional flooding is the main concern in management.

In a few areas, this soil is used as woodland. The dominant trees are yellow poplar, sycamore, red maple, black walnut, green ash, and river birch. The understory plants include hazel alder (tag alder), black willow, switchcane, greenbrier, honeysuckle, poison ivy, boxelder, American hornbeam, and grape. Occasional flooding is the main concern in management for woodland use.

This soil is not used for building site development because of occasional flooding. It is, however, used in the development of recreational facilities.

This Congaree soil is in capability subclass IIw. The woodland ordination symbol is 7A.

DnB—Davidson clay loam, 2 to 8 percent slopes. This soil is well drained. It is on the high stream terraces adjacent to the flood plains along many of the major streams in the county. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is dark reddish brown clay loam 8 inches thick. The subsoil to a depth of 72 inches is dark red clay in the upper part and red clay in the middle and lower parts.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. This soil has a high clay content and is very sticky when wet. It is sometimes referred to as "push dirt" by local farmers since it may stick to the plow and be "pushed" rather than cut and rolled over.

Figure 3.—Congaree fine sandy loam, occasionally flooded, is suited to row crops, such as corn.

Included with this Davidson soil in mapping are small, intermingled areas of Masada, Cecil, and Pacolet soils and a soil that is similar to Davidson soil except that it has a thinner subsoil. Gravel and cobbles are on the surface in some places. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used for row crops. Small acreages are in hay or pasture. Erosion is a hazard, and a clay loam surface layer that reduces infiltration is the main limitation. Conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion. Clod formation can be prevented and soil compaction can be reduced by avoiding tillage operations when the soil is wet.

In forested areas, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, redbud, American holly, sassafras, red maple, greenbrier, staghorn sumac, Virginia creeper, common trumpetcreeper, grape, switchcane, and poison ivy. A clayey subsoil is the main limitation.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant

cover. Also, moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field. This soil has no significant limitations for most recreational uses.

This Davidson soil is in capability subclass IIIe. The woodland ordination symbol is 8C.

DnD—Davidson clay loam, 8 to 15 percent slopes. This soil is well drained. It is on high stream terraces adjacent to the flood plains along many of the major streams in the county. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is dark reddish brown clay loam about 8 inches thick. The subsoil to a depth of about 72 inches is dark red clay in the upper part and red clay loam in the lower part. The substratum to a depth of 85 inches is red sandy clay loam with common rounded quartz gravel throughout.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. This soil has a high clay content and is very sticky when wet. It is sometimes referred to as "push dirt" by local farmers since it may stick to the plow and be "pushed" rather than cut and rolled over.

Included with this Davidson soil in mapping are small, intermingled areas of Masada, Cecil, and Pacolet soils and a soil that is similar to Davidson soil except that it has a thinner subsoil. Gravel and cobbles are on the surface in some places. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used for row crops. Small acreages are in hay or pasture. Steepness of slope and a clay loam surface layer are the main limitations, and erosion is a hazard. Conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion. Clod formation can be prevented and soil compaction can be reduced by avoiding tillage operations when the soil is wet.

In forested areas, the dominant trees are southern red oak, white oak, black oak, scarlet oak, yellow poplar, hickory, shortleaf pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black cherry, redbud, American holly, sassafras, red maple, greenbrier, staghorn sumac, Virginia creeper, common trumpetcreeper, grape, switchcane, and poison ivy. A clayey subsoil is the main limitation.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed where the soil is without plant cover. Also, moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field. This soil has no significant limitations for most recreational uses.

This Davidson soil is in capability subclass VIe. The woodland ordination symbol is 8C.

DoB—Dogue fine sandy loam, 2 to 8 percent slopes. This soil is moderately well drained. It is on low stream terraces adjacent to the flood plains. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 8 inches thick. The subsoil to a depth of 42 inches is brownish yellow clay loam in the upper part, and in the middle part, it is brownish yellow clay loam that has yellowish red mottles. It is mottled yellowish red, strong brown, light brownish gray, and pale brown clay loam in the lower part. The substratum to a depth of 60 inches is mottled light brownish gray, light gray, strong brown, and red clay loam.

Surface runoff is moderately slow. Permeability is moderately slow, and the available water capacity is high. The shrink-swell potential is moderate. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. The seasonal high water table is 1.5 to 3 feet below the surface. This soil is subject to rare flooding.

Included with this Dogue soil in mapping are small, intermingled areas of Masada soils and a soil that is similar to Dogue soil except it is somewhat poorly drained. Also included are small areas of the poorly drained Roanoke soils that are in depressions and small areas of soils on flood plains, such as the well drained Congaree soils and the somewhat poorly drained Chewacla soils. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is cleared and is used for row crops, hay, or pasture. Seasonal wetness is the main limitation, particularly for crops such as tobacco. Some areas are artificially drained; however, the moderately slow permeability requires close spacing of ditches and tile lines for effective drainage.

In some areas, this soil is used as woodland. The dominant trees are yellow poplar, sycamore, southern red oak, loblolly pine, and Virginia pine. The understory plants include flowering dogwood, American hornbeam, sourwood, American holly, honeysuckle, and boxelder. Wetness is the main limitation for the use of equipment.

This soil generally is not used for building site development or recreational facilities because of seasonal wetness and rare flooding.

This Dogue soil is in capability subclass IIe. The woodland ordination symbol is 7W.

EaE—Evard fine sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on the upper side slopes and narrow ridges of the mountain uplands. Most areas of this soil are long and narrow and they range from 5 to about 100 acres.

Typically, the surface layer is about 6 inches thick. It is grayish brown fine sandy loam in the upper part and yellowish brown fine sandy loam in the lower part. The subsoil to a depth of about 33 inches is strong brown sandy clay loam in the upper part, yellowish red clay loam in the middle part, and strong brown sandy clay loam in the lower part. The substratum to a depth of 60 inches is multicolored saprolite that crushes to sandy loam.

Surface runoff is rapid, and the hazard of erosion is severe in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Evard soil in mapping are small, intermingled areas of Hayesville, Edneyville, and Chestnut soils. Also included are a few small areas of Ashe and Saluda soils in the steeper landscape positions, some areas of soils that have a high content of mica throughout, a few small areas of soils that are eroded and that have a sandy clay loam surface layer, and some areas of soils that are stony. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

Most of this soil is used as woodland. The dominant trees are white oak, chestnut oak, scarlet oak, black oak, red maple, shortleaf pine, yellow poplar, sweet birch, Virginia pine, and eastern white pine. The understory plants include flowering dogwood, rhododendron, American holly, Fraser magnolia, cucumbertree (mountain magnolia), eastern hemlock, mountain laurel, and sourwood. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and tree growth is better. Steepness of slope is the main limitation.

This soil generally is not used for row crops because of steepness of slope. It is occasionally used as pasture or hayland.

This soil generally is not used for building site development and recreational facilities because of slope.

This Evard soil is in capability subclass VIe. The woodland ordination symbol is 11R.

EaF—Evard fine sandy loam, 25 to 50 percent slopes. This soil is well drained. It is on side slopes on the lower, more southerly mountain uplands. Areas of this soil are long and narrow and they range from 20 to about 200 acres.

Typically, the surface layer is dark brown fine sandy loam 3 inches thick. The subsurface layer to a depth of about 6 inches is brown fine sandy loam. The subsoil to a depth of about 34 inches is yellowish red sandy clay loam in the upper and middle parts, and red sandy clay loam in the lower part. The substratum to a depth of 80 inches is mottled yellowish red, reddish yellow, and light gray saprolite that crushes to sandy loam.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Evard soil in mapping are small areas of Ashe, Chestnut, Edneyville, and Tate soils. The Edneyville and Chestnut soils are well drained. They are intermingled throughout the map unit. The Ashe soils are somewhat excessively drained and are in the steeper areas. The Tate soils are well drained and are in small drainageways. Also included are a few areas of Evard soils that are eroded and have a sandy clay loam surface layer. Gullies are in some areas, and some areas are stony. The included soils make up about 20 percent of this map unit.

Most areas of this soil are forested. The dominant trees are white oak, chestnut oak, scarlet oak, black oak, red maple, shortleaf pine, yellow poplar, sweet birch, Virginia pine, and eastern white pine. The understory plants include flowering dogwood, rhododendron, American holly, Fraser magnolia, cucumbertree (mountain magnolia), eastern hemlock, mountain laurel, and sourwood. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and trees generally grow better. Steepness of slope is the main limitation.

This soil generally is not used for crops, building site development, or recreational facilities because of steepness of slope.

This Evard soil is in capability subclass VIIe. The woodland ordination symbol is 11R.

ESF—Evard and Saluda fine sandy loams, 25 to 60 percent slopes. This map unit consists of Evard and Saluda soils on mountain side slopes and narrow secondary ridges of the Brushy Mountains area of the county. Areas of this map unit are long and broad and they range from 50 to about 100 acres. These soils were not mapped separately because they are similar in use and management and because accessibility is limited.

Evard soil makes up about 60 percent of this map unit. This soil is well drained, less sloping, and is in smoother areas of the map unit. Typically, the surface layer is dark brown fine sandy loam 3 inches thick. The subsurface layer is brown fine sandy loam to a depth of about 6 inches. The subsoil to a depth of about 34 inches is yellowish red sandy clay loam in the upper part, yellowish red clay loam in the middle part, and red sandy clay loam in the lower part. The substratum to a depth of

80 inches is mottled yellowish red, reddish yellow, and light gray saprolite that crushes to sandy loam.

Saluda soil makes up about 20 percent of this map unit. This soil is well drained and is in the steeper, rougher areas of the map unit. Typically, the surface layer is brown fine sandy loam 6 inches thick. The subsoil to a depth of about 18 inches is yellowish red sandy clay loam. The substratum to a depth of 65 inches is yellowish red, partly weathered mica gneiss that can be dug with equipment.

Surface runoff on these soils is very rapid, and the hazard of erosion is very severe in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. These soils are very strongly acid or strongly acid throughout. The Evard soil has bedrock at a depth of more than 60 inches. The Saluda soil has soft bedrock at a depth of 10 to 20 inches.

Included with these Evard and Saluda soils in mapping are small areas of Ashe, Edneyville, Chestnut, and Tate soils. The Ashe and Chestnut soils are in the steeper, rougher areas. The Edneyville soils are in the less sloping, smoother areas. The Tate soils are in coves or along drainageways. Also included are areas of soils similar to the Saluda soil except that they have soft bedrock 20 to 40 inches below the surface. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

These soils are used mostly as woodland. The dominant trees are white oak, chestnut oak, scarlet oak, black oak, red maple, shortleaf pine, yellow poplar, sweet birch, Virginia pine, and eastern white pine. The understory plants include flowering dogwood, rhododendron, American holly, Fraser magnolia, cucumbertree (mountain magnolia), eastern hemlock, mountain laurel, and sourwood. Soils on foot slopes or in coves, or soils that have north- or northeast-facing slopes tend to be cooler and moister, and trees generally grow better. Steepness of slope is the main limitation.

These soils generally are not used as cropland, for building site development, or for recreational facilities because of slope.

The soils in this map unit are in capability subclass VIIe. The woodland ordination symbol is 11R.

HaD—Hayesville fine sandy loam, 8 to 15 percent slopes. This soil is well drained. It is on ridges of the mountain uplands. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is yellowish brown fine sandy loam 5 inches thick. The subsurface layer is strong brown fine sandy loam to a depth of about 7 inches. The subsoil to a depth of about 55 inches is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red sandy clay loam in the lower part. The substratum to a depth of 64 inches is reddish yellow saprolite that crushes to fine sandy loam.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except in areas where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Hayesville soil in mapping are small, intermingled areas of Evard soils. A few small areas are micaceous. Also included are other small areas of Hayesville soil; some are eroded and have a sandy clay loam or clay loam surface layer, some have a gravelly surface layer, and some have cobbles or stones on the surface. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used as woodland. The dominant trees are scarlet oak, white oak, black oak, chestnut oak, hickory, yellow poplar, shortleaf pine, eastern white pine, and Virginia pine. The understory plants are mainly flowering dogwood, sourwood, black locust, American holly, mountain laurel, rhododendron, blueberry, cucumbertree (mountain magnolia), Fraser magnolia, galax, grape, sassafras, greenbrier, red maple, and poison ivy. This soil has no significant limitations for use as woodland.

This soil generally is not used for crops, for building site development, or for recreational facilities. Erosion is a hazard, and steepness of slope is a limitation. Accessibility is limited in some areas.

This Hayesville soil is in capability subclass IVe. The woodland ordination symbol is 11A.

HaE—Hayesville fine sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on the ridges and upper side slopes of the mountain uplands. Areas of this soil are irregular in shape and they range from 10 to about 50 acres.

Typically, the surface layer is fine sandy loam 6 inches thick. It is very dark grayish brown in the upper part and reddish brown in the lower part. The subsoil to a depth of about 50 inches is red sandy clay loam in the upper part, red clay in the middle part, and red sandy clay loam in the lower part. The substratum to a depth of 60 inches is yellowish red and reddish brown saprolite that crushes to fine sandy loam.

Surface runoff is rapid, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Hayesville soil in mapping are small, intermingled areas of Evard soils, and small areas of Ashe and Tate soils. The Ashe soils are in the steeper areas and the Tate soils are in small draws. Some small areas are micaceous. Also included are other small

areas of Hayesville soils; some are eroded and have a sandy clay loam or clay loam surface layer, some have a gravelly surface layer, and some have stones or cobbles on the surface. The included soils, generally in areas of less than 5 acres, make up about 25 percent of this map unit.

Most of this soil is used as woodland. The dominant trees are scarlet oak, white oak, black oak, chestnut oak, hickory, yellow poplar, shortleaf pine, eastern white pine, and Virginia pine. The understory plants include mainly flowering dogwood, sourwood, black locust, American holly, mountain laurel, rhododendron, blueberry, cucumbertree (mountain magnolia), Fraser magnolia, galax, grape, sassafras, greenbrier, red maple, and poison ivy. Steepness of slope is the main limitation for use of this soil as woodland.

This soil generally is not used for crops, building site development, or recreational facilities. Steepness of slope and inaccessibility of some areas are the main limitations.

This Hayesville soil is in capability subclass VIe. The woodland ordination symbol is 11A.

HbD—Hibriten very cobbly sandy loam, 8 to 15 percent slopes. This soil is well drained. It is on narrow ridges and upper side slopes of the hills that run just south of, and generally parallel to, North Carolina Highway 90 on the east side of the county. This soil is also around Cajah, Rippetoe, and Bradford Mountains in the south-central part of the county. Areas of this soil are in long, narrow bands that range from 5 to 60 acres or more.

Typically, the surface layer is very cobbly sandy loam 8 inches thick. It is dark grayish brown in the upper part and brown in the lower part. The subsoil to a depth of 24 inches is yellowish brown very cobbly sandy loam in the upper part and yellowish red very cobbly sandy clay loam in the lower part. The substratum to a depth of 48 inches is reddish brown, brownish yellow, and brown shattered, weathered sillimanite schist. Below that is fractured sillimanite schist bedrock.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated, exposed areas. The permeability is moderate, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is 20 to 40 inches.

Included with this Hibriten soil in mapping are small, intermingled areas of Pacolet and Rion soils, a few areas of soils that have a high mica content, and some areas of soils that have fewer coarse fragments than Hibriten soil. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used as woodland. The dominant trees are chestnut oak, black oak, scarlet oak, Virginia pine, and pitch pine. The understory plants are mainly mountain laurel, sourwood, flowering dogwood, blueberry, and blackgum. The low available water capacity is caused by shallow depth to bedrock and many coarse fragments. Consequently, tree growth is very slow and quality is poor. This soil is not a choice site for commercial forestry.

This soil generally is not used for crops, building site development, or recreational facilities because of the low available water capacity, the high content of coarse fragments, and the shallow depth to bedrock.

This Hibriten soil is in capability subclass VIs. The woodland ordination symbol is 6R.

HbF—Hibriten very cobbly sandy loam, 15 to 60 percent slopes. This soil is well drained. It is on side slopes of the hills that run just south of, and generally parallel to, North Carolina Highway 90 on the east side of the county. This soil is also around Cajah, Rippetoe, and Bradford Mountains in the south-central part of the county. Areas of this soil are in long, narrow bands that range from 10 to 200 acres or more.

Typically, the surface layer is very cobbly sandy loam about 7 inches thick. It is dark brown in the upper part and brown in the lower part. The subsoil to a depth of about 22 inches is strong brown very cobbly sandy clay loam in the upper part and yellowish red very cobbly sandy clay loam in the lower part. The substratum to a depth of 48 inches is shattered, weathered sillimanite schist that is underlain by hard, fractured sillimanite schist bedrock.

Surface runoff is rapid, and the hazard of erosion is severe in unvegetated, exposed areas. The permeability is moderate, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is 20 to 40 inches.

Included with this Hibriten soil in mapping are small, intermingled areas of Pacolet and Rion soils. Also included are a few areas that have more mica than the Hibriten soil and some areas that have less than 35 percent coarse fragments. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used as woodland. The dominant trees are chestnut oak, black oak, scarlet oak, Virginia pine, and pitch pine. The understory plants are mainly mountain laurel, flowering dogwood, blueberry, and blackgum. The low available water capacity is caused by shallow depth to bedrock and many coarse fragments. Consequently, tree growth is very slow and quality is generally poor. This soil is not a choice site for commercial forestry.

This soil generally is not used for crops, building site development, or recreational facilities because of the low available water capacity, the high content of coarse fragments, the shallow depth to bedrock, and the steepness of slope.

This Hibriten soil is in capability subclass VIIs. The woodland ordination symbol is 6R.

MaB—Masada loam, 2 to 8 percent slopes. This soil is well drained. It is on stream terraces adjacent to the flood plains along the major streams. Areas of this soil are irregular in shape and they range from 5 to 50 acres.

Typically, the surface layer is brown loam 10 inches thick. The subsoil to a depth of 58 inches is yellowish red clay loam in the upper part, strong brown clay loam in the middle part, and yellowish red sandy clay loam in the lower part. The substratum to a depth of 72 inches is mottled strong brown and light gray gravelly sandy loam.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is moderate. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Masada soil in mapping are small, intermingled areas of Davidson and State soils that are well drained. Also included in the lower-lying areas are small areas of Dogue soils that are moderately well drained. Some small areas are gravelly or cobbly. Small areas of upland soils, such as Cecil and Pacolet, are included on the upper parts of the landscape. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is used mostly for row crops, pasture, or urban uses. Erosion is a hazard; however, conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion.

In forested areas, the dominant native trees are shortleaf pine, Virginia pine, yellow poplar, southern red oak, white oak, and hickory. The understory plants are mainly flowering dogwood, sourwood, American holly, blueberry, black cherry, poison ivy, sumac, Virginia creeper, sassafras, greenbrier, grape, switchcane, and red maple. This soil has no major limitations for woodland use and management.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Also, moderate permeability is a limitation for septic tank absorption fields. This limitation generally can be overcome by enlarging the field. The moderate shrink-swell potential of this soil may require some modification in foundation design, such as larger footings. This soil has no major limitations for most recreational uses.

This Masada soil is in capability subclass IIe. The woodland ordination symbol is 10A.

MaD—Masada loam, 8 to 15 percent slopes. This soil is well drained. It is on stream terraces adjacent to the flood plains along the major streams. Areas of this soil are in narrow bands that range from 5 to 50 acres.

Typically, the surface layer is brown loam 5 inches thick. The subsoil to a depth of about 54 inches is dark reddish brown clay loam in the upper part, red clay in the middle part, and red sandy clay loam in the lower part. The substratum to a depth of 60 inches is yellowish red sandy loam with many water-rounded quartz pebbles.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is moderate. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Masada soil in mapping are small, intermingled areas of Davidson and State soils that are well drained and some areas of eroded Masada soils that have a sandy clay loam surface layer. Also included in the lower-lying areas are small areas of Dogue soils that are moderately well drained. Some small areas are gravelly or cobbly. Small areas of upland soils, such as Cecil and Pacolet, are included on the upper parts of the landscape. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is mostly used for row crops, pasture, or urban uses. Erosion is a hazard; however, conservation tillage, crop residue management, winter cover crops, contour tillage, terraces, diversions, stripcropping, and grassed waterways help control runoff and reduce erosion.

In forested areas, the dominant trees are Virginia pine, shortleaf pine, yellow poplar, southern red oak, white oak, and hickory. The understory plants are mainly flowering dogwood, sourwood, American holly, blueberry, black cherry, poison ivy, sumac, Virginia creeper, sassafras, greenbrier, grape, switchcane, and red maple. This soil has no major limitations for woodland use and management.

Erosion is a hazard in areas developed for building sites. Erosion and sediment control practices are needed at construction sites where the soil is without plant cover. Also, moderate permeability is a limitation for septic tank absorption fields. This limitation can generally be overcome by enlarging the field. The moderate shrink-swell potential of this soil may require some modification in foundation design, such as larger footings. This soil has no major limitations for most recreational uses.

This Masada soil is in capability subclass IIIe. The woodland ordination symbol is 10A.

PaE—Pacolet fine sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on ridges and side slopes on Piedmont uplands. Areas of this soil are in wide bands that range from 10 to about 200 acres or more.

Typically, the surface layer is fine sandy loam about 7 inches thick. It is dark grayish brown in the upper part and brown in the lower part. The subsoil to a depth of about 40 inches is reddish brown sandy clay loam in the upper part, red clay and clay loam in the middle part, and yellowish red sandy clay loam in the lower part. The substratum to a depth of 60 inches is yellowish red and brown saprolite that crushes to fine sandy loam.

Surface runoff is rapid, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Pacolet soil in mapping are a few small, intermingled areas of Rion soil, some areas that are stony, and a few areas that have a high content of mica. Also included are a few small areas of soils that have slopes less than 15 percent. Small, old gullied areas are within some delineations of this map unit. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is mostly used as woodland. The dominant trees are shortleaf pine, Virginia pine, southern red oak, scarlet oak, post oak, white oak, yellow poplar, and hickory. The understory plants are mainly flowering dogwood, sourwood, black cherry, sassafras, American holly, greenbrier, grape, red maple, and poison ivy. Steepness of slope is the main limitation for the use of this soil as woodland.

This soil is also used as pasture or hayland. Steepness of slope is the main limitation.

This soil generally is not used for row crops, building site development, and recreational facilities because of steepness of slope.

This Pacolet soil is in capability subclass VIe. The woodland ordination symbol is 7R.

PaF—Pacolet fine sandy loam, 25 to 40 percent slopes. This soil is well drained. It is on side slopes of the Piedmont uplands. Areas of this soil are irregular in shape and they range from 20 to about 200 acres.

Typically, the surface layer is reddish brown fine sandy loam 2 inches thick. The subsoil to a depth of 36 inches is red sandy clay loam in the upper part, red clay in the middle part, and red loam in the lower part. The substratum to a depth of 80 inches is mottled light brown and light reddish brown saprolite that crushes to fine sandy loam.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Pacolet soil in mapping are a few small, intermingled areas of Rion soil, some areas that are stony, and a few areas that are micaceous or have slopes more than 40 percent. Small, old gullied areas are within some delineations of this map unit. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is mostly used as woodland. The dominant trees are shortleaf pine, Virginia pine, southern red oak, scarlet oak, post oak, white oak, yellow poplar, and hickory. The understory plants are mainly flowering dogwood, sourwood, black cherry, sassafras, American holly, greenbrier, grape, red maple, and poison ivy. Steepness of slope is the main limitation for the use of this soil as woodland.

This soil generally is not used for crops, building site development, or recreational facilities because of steepness of slope.

This Pacolet soil is in capability subclass VIIe. The woodland ordination symbol is 7R.

Po—Potomac very cobbly loamy sand, frequently flooded. This soil is nearly level and is somewhat excessively drained. It is on flood plains along Wilson Creek, Mulberry Creek, and the Johns River. Areas of this soil are generally in long, narrow bands adjacent to the streams; they range from 5 to about 50 acres. These areas are the result of major floods that scoured away the previous soil, leaving sand and rounded rock fragments and, in places, rerouted stream flow.

Typically, the surface layer is dark brown very cobbly loamy sand 2 inches thick. The underlying material to a depth of 60 inches is brown very cobbly sand in the upper part, yellowish brown very cobbly sand in the middle part, and yellowish brown extremely cobbly sand in the lower part.

Surface runoff is medium. The permeability is rapid or very rapid, and the available water capacity is low. The shrink-swell potential is low. This soil ranges from strongly acid to neutral throughout. Depth to bedrock is more than 60 inches. The seasonal high water table is 4 to 6 feet below the surface. This soil is subject to frequent, brief flooding.

Included with this Potomac soil in mapping are small areas of Buncombe soils that occur where deep sand overlies the rock fragments. Also included in depressions and old stream channels are soils similar to, but wetter than, the Potomac soils. The included soils are in small areas and they make up about 15 percent of this map unit.

Most of this soil is either in small trees and shrubs or is not vegetated. In areas where trees do grow, yellow poplar, river birch, sweet birch, and sycamore are dominant. The understory plants include hazel alder (tag alder), American hornbeam, black willow, honeysuckle, and greenbrier. This soil is not suited to commercial timber production.

This soil is not used for crops, pasture, commercial forestry, building site development, or most recreational facilities because of droughtiness, many rock fragments, and frequent flooding.

This soil is occasionally used as a source of rounded stones, gravel, or sand for construction and landscaping.

This Potomac soil is in capability subclass Vw. It is not assigned a woodland ordination symbol.

Pt—Pits, Quarries. This miscellaneous map unit consists of areas where all the soil material has been removed and the underlying rock has been taken out and crushed for gravel. The largest quarry is on Hibriten mountain in the central part of the county. Several small gravel pits are scattered throughout the county.

Included with this map unit are a few small areas that have not been excavated. Also included are areas of spoil where the soil material and rock have been dumped.

This map unit is not used for crops, pasture, building site development, recreational facilities, or woodland. The spoil areas have very little vegetation and are a source of sediment. The steepness of slope on the cut or filled areas is a major limitation, and erosion is a hazard.

Any interpretation of soil use requires onsite investigation. This map unit has not been assigned to a capability subclass nor a woodland ordination symbol.

RnE—Rion sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on short side slopes on Piedmont uplands. Areas of this soil are in narrow bands and they range from 5 to about 80 acres.

Typically, the surface layer is sandy loam about 11 inches thick. It is dark yellowish brown in the upper part and brown in the lower part. The subsoil to a depth of 37 inches is brown sandy loam in the upper part, strong brown sandy clay loam in the middle part, and brown sandy loam in the lower part. The substratum to a depth of 68 inches is multicolored saprolite that crushes to sandy loam.

Surface runoff is rapid, and the hazard of erosion is severe in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Rion soil in mapping are a few small, intermingled areas of Pacolet soils, a few areas of soils that have a strong brown, clayey subsoil, and areas of soils that have less development in the subsoil. Also included are some areas of soils that are gravelly or stony, and a few areas of soils that have a high content of mica. Small, old gullied areas are within some delineations of this map unit. The included soils make up about 20 percent of this map unit.

This soil generally is not used as cropland because of steepness of slope. It is used as pasture in some areas.

In most areas, this soil is used as woodland. The dominant native trees are shortleaf pine, Virginia pine, southern red oak, scarlet oak, post oak, white oak, and yellow poplar. The understory plants include flowering dogwood, persimmon, sassafras, and American holly. Steepness of slope is the main limitation for use as woodland.

This soil is rarely used for building site development or recreational facilities. Steepness of slope is the main limitation, and erosion is a hazard.

This Rion soil is in capability subclass VIe. The woodland ordination symbol is 12R.

RnF—Rion sandy loam, 25 to 40 percent slopes. This soil is well drained. It is on side slopes of the Piedmont uplands. Areas of this soil are long and narrow and they range from 25 to about 350 acres.

Typically, the surface layer is sandy loam 7 inches thick. It is dark grayish brown in the upper part and brown in the lower part. The subsoil to a depth of 32 inches is brown sandy loam in the upper part, strong brown sandy clay loam in the middle part, and brown sandy loam in the lower part. The substratum to a depth of 60 inches is brown saprolite that crushes to sandy loam.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Rion soil in mapping are a few small, intermingled areas of Pacolet soils that are well drained, a few areas of soils that have little or no subsoil development, some areas of soils that are gravelly or stony, and a few areas of soils that have a high content of mica. Small, old gullied areas are within some delineations of this map unit. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used as woodland. The dominant native trees are shortleaf pine, Virginia pine, southern red oak, scarlet oak, post oak, white oak, and yellow poplar. The understory plants include flowering dogwood, persimmon, sassafras, and American holly. Steepness of slope is the main limitation for use as woodland.

This Rion soil is not used for crops, building site development, or recreational facilities. Steepness of slope is the main limitation, and erosion is a hazard.

This Rion soil is in capability subclass VIIe. The woodland ordination symbol is 12R.

Ro—Roanoke loam. This soil is nearly level and is poorly drained. It is on low stream terraces adjacent to the flood plains along major streams. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is dark grayish brown loam 7 inches thick. The subsoil extends to a depth of 45 inches. In the upper part, it is grayish brown clay that has strong brown mottles. In the middle part, it is gray clay that has strong brown mottles, and in the lower part, it is light brownish gray clay loam that has strong brown and gray mottles. The substratum to a depth of 80 inches is mottled light gray, reddish yellow, yellowish red, and gray clay loam in the upper part and it is greenish gray sandy loam in the lower part.

Surface runoff is slow. The permeability is slow, and the shrink-swell potential is moderate. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. The seasonal high water table remains at or near the surface throughout most of the year.

Included with this Roanoke soil in mapping are small, intermingled areas of Dogue soils that are moderately well drained, and a soil that is similar to Roanoke soil except that it is somewhat poorly drained. Also included are small areas of Wehadkee and Chewacla soils on the adjacent flood plains. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

This soil is used mostly for pasture and row crops. Water management is often difficult because the soil is in a low position on the landscape and it has a clayey subsoil. In some areas, this soil is artificially drained. The slow permeability, however, requires very close spacing of ditches and tile lines for effective drainage.

In some areas, this soil is used as woodland. The dominant native trees are willow oak, yellow poplar, and American beech. The understory plants include hazel alder (tag alder), boxelder, black willow, and winged elm. Pines generally do not grow on this soil because of wetness and ponding.

This soil is not used for building site development or recreational facilities. Wetness and slow permeability are the main limitations.

This Roanoke soil is in capability subclass IVw. The woodland ordination symbol is 8W.

RSF—Rock outcrop-Ashe complex, 25 to 80 percent slopes. This map unit consists of Rock outcrop and Ashe soil in mountainous areas of the county. Ashe soil is somewhat excessively drained. These areas of Rock outcrop and Ashe soil are too small and too intricately mixed to be mapped separately. The Rock outcrop is granite bedrock and it makes up about 60 percent of the map unit. The Ashe soil makes up about 20 percent.

Typically, the surface layer of the Ashe soil is dark yellowish brown stony sandy loam about 4 inches thick. The subsoil to a depth of about 22 inches is yellowish brown stony sandy loam. Hard granite gneiss is below the subsoil.

Surface runoff is very rapid, and the hazard of erosion is very severe in unvegetated areas. The permeability of the Ashe soil is moderately rapid, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout. Depth to bedrock is 20 to 40 inches.

Included in mapping are very small, intermingled areas of Chestnut and Saluda soils. Also included are narrow strips of soils that are less than 20 inches to bedrock and that occur where the soil and the Rock outcrop converge. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

The soil in this map unit is not used for farming because of steepness of slope, rock outcrop, stoniness, depth to bedrock, and droughtiness.

All areas in this map unit are forested. The dominant trees are chestnut oak, scarlet oak, blackjack oak, Virginia pine, pitch pine, and eastern white pine. The understory plants include mountain laurel, blueberry, and turkey beard. The Ashe soil is not used for commercial forestry. The main limitations are steepness of slope, rock outcrop, stoniness, depth to bedrock, and droughtiness.

The Ashe soil is not used for building site development or recreational facilities because of steepness of slope and rock outcrop.

The capability subclass for Ashe soil is VIIs. The woodland ordination symbol is 11X. The capability subclass for Rock outcrop is VIIIs.

SeB—State loam, 2 to 8 percent slopes. This soil is well drained. It is on low stream terraces adjacent to the flood plains along the major streams. Areas of this soil are irregular in shape and they range from 5 to about 50 acres.

Typically, the surface layer is brown loam 8 inches thick. The subsoil to a depth of 48 inches is brown loam in the upper part, strong brown sandy clay loam in the middle part, and strong brown fine sandy loam in the lower part. The substratum to a depth of 80 inches is yellowish brown fine sandy loam in the upper part and brown loamy sand in the lower part.

Surface runoff is slow, and the hazard of erosion is slight in unvegetated, exposed areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this State soil in mapping are small, intermingled areas of Congaree and Masada soils that are well drained. Also included in the lower positions on the landscape are small areas of Dogue soils that are

moderately well drained. The included soils, generally in areas of less than 5 acres, make up about 20 percent of this map unit.

In most areas, this soil is used for many types of row crops, or as hayland or pasture. It has no major limitations.

In a few areas, this soil is used as woodland. The dominant native trees are loblolly pine, Virginia pine, yellow poplar, southern red oak, and black walnut. The understory plants include flowering dogwood, sourwood, American holly, and blueberry. This soil has no major limitations for use as woodland.

This soil is used occasionally for building site development and recreational facilities. Wetness is the main limitation.

This State soil is in capability subclass IIe. The woodland ordination symbol is 9A.

TaB—Tate fine sandy loam, 2 to 8 percent slopes. This soil is well drained. It is in small draws and coves and on benches and foot slopes of mountains. Areas of this soil are irregular in shape and they range from 4 to about 15 acres.

Typically, the surface layer is brown fine sandy loam about 12 inches thick. The subsoil to a depth of about 48 inches is strong brown loam in the upper part, strong brown clay loam in the middle part, and brown fine sandy loam in the lower part. The substratum to a depth of 60 inches is dark yellowish brown fine sandy loam.

Surface runoff is medium, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Tate soil in mapping are a few small areas of Wehadkee and Chewacla soils adjacent to streams and a few small areas of a soil that has a dark brown surface layer. Also included are areas of soils that have a gravelly or stony surface layer. The included soils, generally in areas of less than 5 acres, make up about 15 percent of the map unit.

In most areas, this soil is used as woodland. The dominant trees are eastern white pine, yellow poplar, eastern hemlock, red maple, black locust, and black walnut (fig. 4). The understory plants are mainly flowering dogwood, sourwood, mountain laurel, rhododendron, blueberry, greenbrier, and poison ivy. This soil has no significant limitation for use as woodland.

In a few areas, this soil is used for pasture, homesites, or for growing ornamentals. Steepness of slope and erosion are the main limitations for the use of this soil for crops, building sites, or recreational facilities. A few areas may have seepage from upper slopes during wet periods.

This Tate soil is in capability subclass IIe. The woodland ordination symbol is 12A.

TaE—Tate fine sandy loam, 8 to 25 percent slopes. This soil is well drained. It is in small draws and coves and on benches and foot slopes of mountains. Areas of this soil are irregular in shape and they range from 5 to about 40 acres.

Typically, the surface layer is brown fine sandy loam 4 inches thick. The subsurface layer is brown loam to a depth of 12 inches. The subsoil to a depth of 48 inches is strong brown loam in the upper part, strong brown clay loam in the middle part, and brown fine sandy loam in the lower part. The substratum to a depth of 60 inches is dark yellowish brown fine sandy loam.

Surface runoff is rapid, and the hazard of erosion is moderate in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is low. This soil ranges from very strongly acid to medium acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included with this Tate soil in mapping are a few small areas of a soil that has a dark brown surface layer. Also included are a few areas of soils that have a gravelly or stony surface layer. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is used as woodland. The dominant trees are eastern white pine, yellow poplar, eastern hemlock, red maple, black locust, and black walnut. The understory plants are mainly flowering dogwood, sourwood, mountain laurel, rhododendron, blueberry, greenbrier, and poison ivy. Steepness of slope is the main limitation for use as woodland.

In a few areas, this soil is used as pasture, homesites, or for growing ornamentals. Steepness of slope and erosion are the main concerns in the use of this soil for crops, building sites, and recreational facilities. A few areas may have seepage from upper slopes during wet periods.

This Tate soil is in capability subclass VIe. The woodland ordination symbol is 12R.

UaB—Urban land-Arents complex, occasionally flooded. This map unit consists of nearly level soils on flood plains and low terraces of Lower Creek and its tributaries near Lenoir. In areas of these soils, industrial and urban development has altered or covered the soil to such an extent that identification is not practical. This map unit is 60 percent Urban land and 25 percent Arents. These soils are too intricately mixed to map separately. The areas of this complex range from 5 to 200 acres.

Urban land consists of areas that have been filled with several feet of loamy or clayey soil material, leveled and covered with asphalt, concrete, buildings, or other impervious cover.

Arents are areas that have been altered by the addition of fill material over the original soil surface, and are 20 inches to several feet thick. The fill consists

Figure 4.—Yellow-poplar is a common tree on Tate fine sandy loam, 2 to 8 percent slopes.

mostly of loamy or clayey soil material transported mainly from cut or graded areas of soils on uplands and terraces. Materials, such as stones, logs, stumps, and solid waste, are in the fill material in some places.

Included in mapping are small, intermingled areas of Congaree, Chewacla, Wehadkee, and Masada soils. Also included are cut areas where all, or almost all, of the soil material has been removed.

The main limitations for permanent structures or other development are the high water table, the settling of filled areas, and the sediment damage to streams from erosion of the fill material. Also, flooding is a hazard. When natural flood plains are filled, the normal flow of floodwater is constricted and often raises the flood level in the area immediately upstream.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol. Onsite investigation would be required to determine suitability for any proposed use.

UmC—Urban land-Masada complex, 2 to 15 percent slopes. This map unit consists of Urban land and Masada soil on terraces. The areas range from 5 to about 500 acres.

The Urban land is covered by impervious material and makes up about 60 percent of this map unit. Most of the soil has been disturbed by cutting, filling, grading, and shaping during the process of urbanization. The original landscape topography has been changed to fit the intended use.

The Masada soil makes up about 25 percent of this map unit. Typically, this soil has a brown loam surface layer 10 inches thick. The subsoil to a depth of 58 inches is yellowish red clay loam in the upper part,

strong brown clay loam in the middle part, and yellowish red sandy clay loam in the lower part. The substratum to a depth of 72 inches is mottled strong brown and light gray gravelly sandy loam.

Surface runoff is medium, and the hazard of erosion is severe in unvegetated areas. The permeability and the available water capacity are moderate. The shrink-swell potential is moderate. This soil is very strongly acid or strongly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches.

Included in mapping are small areas that have been cut, filled, or altered, and not covered with impervious material. Also intermingled within this map unit are small areas of Cecil or Pacolet soils.

The main limitation of these soils is the very rapid surface runoff caused by the impervious surfaces. The runoff increases the potential for flooding downstream. Steep cut and filled banks are subject to erosion and caving, which can cause sedimentation downstream. Sediment and erosion control practices are very important in areas of this map unit.

Onsite investigation is required to determine suitability for any proposed use.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

Wk—Wehadkee loam, frequently flooded. This soil is nearly level and is poorly drained. It is on flood plains along streams. Areas of this soil are generally long and narrow and they range from 5 to about 100 acres.

Typically, the surface layer is dark grayish brown loam 10 inches thick. The underlying material to a depth of 37 inches is dark grayish brown clay loam in the upper part; mottled strong brown, grayish brown, and reddish brown clay loam in the middle part; and dark gray clay loam in the lower part. The next layer to a depth of 80 inches is gray stratified sandy loam and sand.

Surface runoff is very slow or ponded. The permeability is moderate, and the shrink-swell potential is low. This soil ranges from strongly acid to slightly acid throughout except where lime has been added. Depth to bedrock is more than 60 inches. The seasonal high water table is at or near the surface. This soil is subject to frequent, brief flooding.

Included with this Wehadkee soil in mapping are small, intermingled areas of Chewacla and Roanoke soils and some soils that have a thin loamy sand surface layer as a result of deposition from flooding. The included soils, generally in areas of less than 5 acres, make up about 15 percent of this map unit.

In most areas, this soil is cleared and is used as pasture or hayland. It is occasionally used for row crops in areas that have been artificially drained. Seasonal wetness is the main limitation, and frequent flooding is a hazard.

In some areas, this soil is used as woodland. The dominant trees are willow oak, water oak, red maple, yellow poplar, and river birch. The understory plants include hazel alder (tag alder), black willow, switchcane, greenbrier, honeysuckle, poison ivy, boxelder, American hornbeam, and grape. Seasonal wetness and frequent flooding are the main concerns for woodland use and management.

This soil is not used for building site development or recreational facilities because of seasonal wetness and frequent flooding.

This Wehadkee soil is in capability subclass VIw. The woodland ordination symbol is 7W.

Important Farmland

Some of the soils in Caldwell County have a long history of agricultural uses. There is much interest in the relative value of the soils for these uses. To provide information about the farmland in Caldwell County, based on definitions provided by the U.S. Department of Agriculture, the soils are identified as "Prime Farmland" and "State and Locally Important Farmland." The location of each listed map unit is shown on the detailed maps in the back of this publication, and the acreage of each map unit is shown in table 4. Information about soil qualities that affect use and management is in the section "Detailed Soil Map Units."

Prime Farmland

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

About 7 percent, or 20,686 acres, of the county is prime farmland. The largest areas of prime farmland are in map units 1 and 2 on the general soil map; areas of State loam, 2 to 8 percent slopes, along some streams; and Tate fine sandy loam, 2 to 8 percent slopes, in coves throughout the mountain areas.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are wet, more erodible, droughty, or difficult to cultivate and less productive than prime farmland.

The following map units, or soils, make up prime farmland in Caldwell County. This list does not constitute a recommendation for a particular land use.

ApB Appling sandy loam, 2 to 8 percent slopes
CeB2 Cecil sandy loam, 2 to 8 percent slopes, eroded
DnB Davidson clay loam, 2 to 8 percent slopes
DoB Dogue fine sandy loam, 2 to 8 percent slopes
MaB Masada loam, 2 to 8 percent slopes
SeB State loam, 2 to 8 percent slopes
TaB Tate fine sandy loam, 2 to 8 percent slopes

State and Locally Important Farmland

Farmland of state and local importance consists of soils other than those designated prime farmland. In one or more ways, their characteristics do not meet the requirements for prime farmland. They are suitable for producing crops economically, however, when managed according to modern farming methods. This includes management practices, such as drainage, which are needed to control excess water.

Farmland of state and local importance may be in crops, pasture, woodland, or other land, but not urban and built-up land or water areas. It must be used for producing food or fiber or be available for these uses. For detailed information on the criteria used in designating important farmland, consult the local staff of the Soil Conservation Service.

About 20 percent, or 58,822 acres, of the county meets the soil requirements for farmland of state and local importance. The major areas of these soils are in General Soil Map Units 1, 2, and 4. Also, small areas of Chewacla loam, occasionally flooded, and Congaree fine sandy loam, occasionally flooded, along many smaller streams and Tate fine sandy loam, 8 to 25 percent slopes, in coves are important farmland.

The following map units, or soils, are important to state and local agriculture in Caldwell County. This list does not constitute a recommendation for a particular land use.

ApD Appling sandy loam, 8 to 15 percent slopes
CeD2 Cecil sandy loam, 8 to 15 percent slopes, eroded
Cm Chewacla loam, occasionally flooded
Co Congaree fine sandy loam, occasionally flooded
DnD Davidson clay loam, 8 to 15 percent slopes
MaD Masada loam, 8 to 15 percent slopes
TaE Tate fine sandy loam, 8 to 25 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Billy L. Foutz, district conservationist, J. Henry Vanstory, agricultural extension agent, and Foy D. Hendrix, conservation agronomist, Soil Conservation Service, helped plan and write this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the county, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

Cropland acreage has slightly decreased during the past 10 years in Caldwell County. At the same time, conversion of land to nonagricultural uses, mainly for residential and industrial development, has increased. Most of this land was formerly woodland.

According to North Carolina Agricultural Extension Service data, Caldwell County has approximately 19,000 acres of cropland and 20,000 acres of pasture and hayland. In 1981, it was estimated that tobacco was grown on 285 acres; corn on 13,600 acres; soybeans on 1,500 acres; and small grains, including wheat, oats, and barley, on 2,200 acres. Most of the pasture and hayland is in tall fescue, and small acreages are in alfalfa, orchardgrass, and red clover.

Soil erosion is a major concern on about 75 percent of the cropland and pasture in the county. Erosion is a hazard on all the soils on uplands if slope is more than 4 percent. The eroded Cecil soil is in particular need of erosion control because this soil is used for much of the upland farming.

Erosion reduces productivity as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Cecil, Pacolet, Appling, Hayesville, Masada, and Davidson soils. The deep plowing with larger tractors and plows tends to complete this mixing of subsoil and topsoil layers.

Soil erosion on farmland also results in sedimentation of streams and reservoirs. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, recreation, and for use by fish and wildlife.

Resource management systems provide protective cover, reduce runoff, and increase infiltration. Improved cropping systems, conservation tillage, crop residue use, terraces, stripcropping, grassed waterways, and field

borders are some of the practices that can reduce the erosion hazard on cropland.

Slopes generally are relatively short, but grassed waterways or terraces and diversions, or both, are needed to reduce damage from surface water runoff. Contour farming is also beneficial. Stripcropping is beneficial on the longer slopes. Assistance is available from the local Soil Conservation Service office for the design and layout of erosion control practices on cropland.

In addition to erosion problems on sloping land, drainage is a problem on Chewacla, Wehadkee, Roanoke, and Dogue soils.

Most of the soils in Caldwell County are low in fertility; however, Wehadkee, Congaree, and Chewacla soils are somewhat more fertile because they formed in recent alluvium.

The pH level (reaction) in most of the soils is naturally low. The soils on the uplands are very strongly acid or strongly acid in their natural state. Applications of 1 to 4 tons of lime per acre may be needed to raise the pH level sufficiently for certain grain crops or grass.

As lime raises the pH, the level of acidity in the soil is reduced. The acidity level in the soil affects the availability of many plant nutrients and the activity of beneficial bacteria. Lime also provides calcium. If dolomitic lime is used, magnesium is provided as well. The addition of lime neutralizes exchangeable aluminum and thereby counteracts the adverse effects aluminum has on many important crops grown in the county.

Liming requirement recommendations are based upon soil test determinations. In soils that have a sandy surface layer, not only can available calcium levels be low but also magnesium. Only a soil test can determine the need of either calcitic or dolomitic liming. Also, the desired pH levels differ, depending upon the soil properties and the crop.

Nitrogen is required for all crops; however, if other nutrients, especially calcium, are in adequate supply, application of nitrogen is generally not required for nitrogen-fixing legumes, such as clovers, soybeans, and alfalfa, after they have been established. No soil test is available for predicting nitrogen requirements. Appropriate rates are discussed in the "Yields Per Acre" section under a description of good management practices. Because nitrogen can be readily leached from sandy soils, it may be needed more than once during the growing season.

The need for phosphorus fertilizers can be predicted from soil tests. Phosphate requirements for specific crops are determined by sampling each field and obtaining the soil test recommendations. In Caldwell County, a soil test of each field is particularly important to determine phosphate requirements because past fertilizer applications tend to build up in the soil. Potassium requirements are similarly determined by soil tests.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous.

Most of the soils used for crops in Caldwell County have a sandy loam, sandy clay loam, clay loam, or loam surface layer that is generally low in organic matter (0 to 2 percent). Intense rainfall causes the surface to crust on some of these soils. Once the crust forms, the soil is almost impervious to water. The crust reduces infiltration and increases runoff. Regular addition of crop residue, manure, and other organic matter improves soil structure and reduces crusting, thereby increasing the infiltration rate. A good organic matter content is in the 3 to 8 percent range. The soils with greater clay content, such as Cecil, Pacolet, and Davidson, may be somewhat cloddy if they are cultivated under wet conditions.

Estimated yields of other crops can be provided by the Soil Conservation Service or the North Carolina Agricultural Extension Service.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. Nitrogen rates for corn on soils that have a yield potential of only 125 to 150 bushels an acre should be 140 to 160 pounds of nitrogen an acre. Where the yield potential is only 100 bushels an acre, rates of 100 to 120 pounds of nitrogen an acre are needed. Application of nitrogen in excess of potential yields is generally not a sound practice. Excess fertilizer that is not used by a crop causes pollution and is expensive. Where corn follows harvested soybeans, nitrogen rates can be reduced 20 to 30 pounds an acre.

Most of the soils in the county are suited to grasses and legumes, such as tall fescue, orchardgrass, alfalfa, ladino clover, and red clover. Yields and quality of forages vary from farm to farm and from one soil series to another. Soils on steeper slopes and areas that are stony have severe limitations because of the difficulty in establishing and maintaining forage plants.

Fertilizer and lime are needed on most soils in the county as they are low in fertility, particularly calcium and phosphorus. Fertilizer and lime requirements should be based on the results of soil tests, on the kind of forage, and the desired yields. Fertilizer and lime should be incorporated into a well-prepared seedbed before planting. Fertility and lime levels should be maintained by annual top-dress applications after the sod has been established. For maximum yields, fertilizer should be applied to cool-season grasses (fescue and orchardgrass) in spring and fall just before the growing seasons.

Field crops suited to the soils and climate of Caldwell County include tobacco, soybeans, corn, grain sorghum, and some that are not commonly grown, such as sunflowers, sweet potatoes, and various truck crops. Wheat, oats, barley, rye, tall fescue, alfalfa, and orchardgrass are the most common close-growing crops.

Soils in Caldwell County better suited to tobacco production are also ideal for truck crops. Cecil, Appling, State, Masada, and Davidson soils are good for truck crops. Most of the well drained soils in Caldwell County can be used for orchards and nursery plants.

Except for soils on bottom lands, most of the soils in Caldwell County that are well suited to crops are well suited to urban development. Soil interpretative data for various land uses are included in this survey. The most productive prime farmland soils should be considered for farming rather than for nonfarm development.

The average yield per acre that can be expected of the principal crops under a high level of management are shown in table 5. Individual crop yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic conditions.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

In older, established native grass sods, better quality and quantity of forage can be obtained by the renovation of grassland and establishment of a desirable grass-clover mixture. On steeper slopes, renovation work should be done in contour strips to reduce soil loss. Also, the introduction of clover by over-seeding to a desirable grass sod will greatly improve the quality of forage while permitting the reduction of nitrogen fertilizer required for the sod.

Rotation grazing by use of cross fencing is a practice needed to avoid overgrazing or undergrazing on pastureland. Grazing closer than three inches on most species greatly reduces forage production; undergrazing reduces feeding value and encourages diseases and insects. Mowing helps to control uneven weed growth and helps keep plants at their most nutritious stage. To get the greatest nutrient value from fescue hay, the forage plants need to be cut just before they start to make seed head.

Access roads to and through the pasture should be installed on the contour to prevent soil loss and to aid in fertilization and management.

The soils of the county are divided into three management groups based on limitations, hazards, and productive capacities for hay and pasture.

The well drained soils that have slopes less than 25 percent and are not stony are well suited to most hay and pasture plants grown in the county. Erosion, however, is a hazard.

Soils that have slopes more than 25 percent are poorly suited to pasture because of steepness of slope, stoniness, or droughtiness.

The poorly drained soils on flood plains, such as Wehadkee and Roanoke soils, are suited to forage plants that are tolerant to wet soil conditions. If adequately drained, these are some of the most productive soils in the county.

The use of herbicides for weed control is a common practice in Caldwell County. Successful use results in less tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates for both of these properties were determined for the soils described in this survey. Table 15 shows a general range of organic matter content. The surface texture is shown in table 14 in the USDA texture column.

In some cases, the organic matter content projected for the soils may range outside that shown in the table. Higher ranges may occur in soil areas that have received high amounts of animal waste or commercial fertilizers. New soils currently being brought into cultivation may have higher levels of organic matter content in their surface layer than similar soils that have been in cultivation for a long time. Conservation tillage may also increase organic matter content in the surface layer. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion or other causes. Other factors may also affect organic matter content for a given soil. Current soil tests should be used for specific organic matter determinations.

Rapid leaching of herbicides may damage young plants or prevent normal seed germination in sandy soils with less than 2 percent organic matter. The effectiveness of herbicides commonly decreases as organic matter levels exceed 6 to 10 percent.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant

diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the North Carolina Agricultural Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use. Caldwell County does not have any class I soils.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w,* or *s,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w* or *s*.

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, Alan Colwell, forester, and Jim Brown, silviculturist, U.S. Forest Service, helped prepare this section.

The forests of Caldwell County provide wood products, scenic beauty, wildlife habitat, and opportunities for outdoor recreation and nature study. They help protect water quality, control erosion and sedimentation, and abate noise. By planning and applying forest management practices, these forests should continue to provide benefits and opportunities for many uses.

Woodlands cover about 70 percent, or 225,000 acres of Caldwell County. About 175,000 acres is in private ownership that includes a significant acreage in commercial forests. Publicly-owned forests make up about 50,000 acres, of which about 49,500 acres is in Pisgah National Forest. The rest is in Tuttle State Forest and National Park Service land along the Blue Ridge Parkway.

Most privately owned woodland is not being intensively managed, although many management techniques are available to forest managers in Caldwell County. Such techniques include establishing, weeding, and thinning young stands; propagating more productive species and genetic varieties; using short harvesting rotations and complete fiber utilization; controlling insects, diseases, and forest weeds; and increasing growth by using fertilizer. Even though timber crops require many years to grow, intensive forest management can produce the greatest yield of the most valuable crop in the least possible time.

In intensive management, the productive capacity of the forest land is determined based on the site quality

for several tree species (fig. 5). Comparisons are made for potential yield and value so that the most productive and valued tree can be selected for each parcel of land. A forest manager can use this information to make realistic economic decisions that meet with individual preferences.

Soil conditions are an important factor in forest management. The soil provides all the essential elements required for tree growth except those elements from the atmosphere. The soil is a reservoir for moisture and also provides the medium in which a tree is anchored. Windthrow, or blow down, can be a problem in shallow soils. Soil characteristics, such as chemical composition, texture, structure, depth, and position, affect the availability of moisture and nutrients, which in turn affect tree growth. Strong correlations exist between productivity and various soil characteristics, such as depth and position on the slope *(17)*.

Topographic features and latitude and elevation are important variables in assessing site suitability for tree growth. Latitude and elevation partly determine the amount of incoming solar radiation and the rate of evaporation, or they otherwise influence the moisture-supplying capacity of soil. The best growth generally is on north and east aspects, on lower slopes, in sheltered coves, and on gentle concave slopes *(19)*.

Thinning is very important in forest management because it leaves room for the best trees to grow. Pine trees can increase in diameter by 20 percent, and the value per tree increases dramatically as the diameter

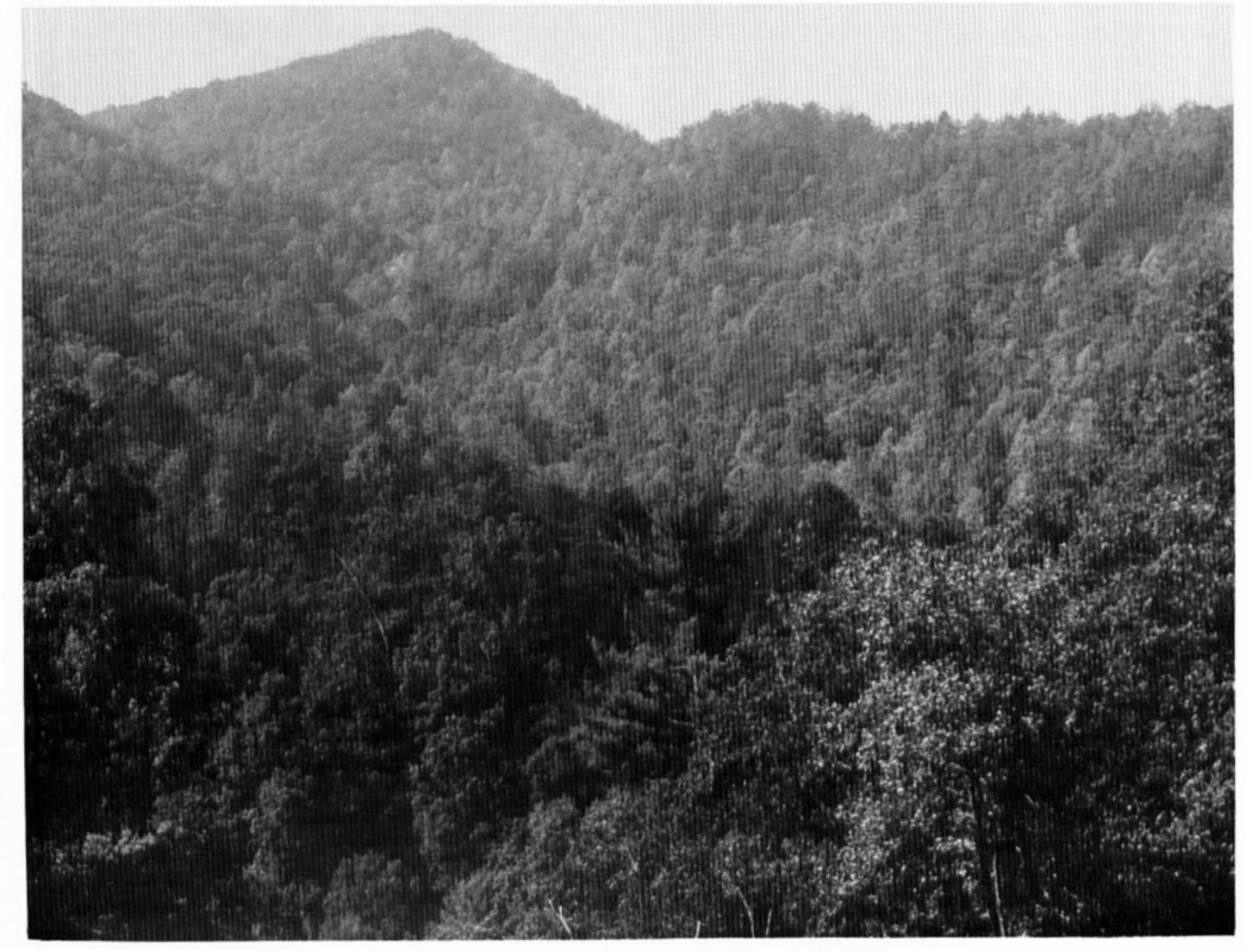


Figure 5.—This forest of mixed hardwoods and white pine is on Chestnut and Edneyville soils, 25 to 50 percent slopes.

increases. Thinning can increase the total merchantable yield by 10 percent (fig. 6). Thinning provides immediate income as the diseased, poorly formed, and slow growing trees are harvested. Very little hardwood thinning is done in Caldwell County, but this can change as markets for firewood develop. In addition, firewood harvesting can reduce reforestation costs on harvested sites *(11)*.

Erosion control during and after logging operations is an important phase of woodland management. Harvesting is not the main cause of erosion. Erosion occurs mainly where the organic surface litter has been disturbed or removed, such as near access roads, skid trails, and loading areas.

The two main concerns in erosion control management at a logging site are protecting streams and streambanks and managing overland water flow *(11)*. Several erosion control techniques are helpful.

Filter strips (vegetated areas) between the logged areas and streams help settle out soil moved from the site. Crossing streams with roads or skid paths should be avoided if possible. Where crossing is necessary, streambanks should be protected by culverts, log bridges, or similar crossing structures.

Roads and trails should be laid out on the contour as much as possible. Also, other water control methods should be used, such as water bars, culverts, broad based dips, and out sloping of roads. Roads should be on as low a grade and as narrow as feasible.

Logging methods vary in the degree to which they cause erosion. Logging methods are not as critical on nearly level land as on steeper land. The heavy use of large, rubber-tired skidders on steep land can destroy much of the surface cover. Other methods, such as using smaller equipment and cable logging in steep areas, reduce the threat of erosion. Loading areas

Figure 6.—Thinning has increased the value of these 18-year-old white pines on Cecil sandy loam, 8 to 15 percent slopes, eroded.

should be as small as feasible and be located away from streams.

Preparing a harvested site for reforestation can cause erosion. As in harvesting, the objective is to disturb as little of the organic surface layer as is necessary. Site preparation reduces or removes undesirable vegetation that competes with the desirable regeneration for light, nutrients, and moisture, and it sets the stage for rapid growth of the new stand. An investment in site preparation pays generous dividends in increased growth, and it reduces future costs for release and weeding of the young stand.

Sites are cleared for reforestation by using controlled burning or herbicides, by hand cutting residual brush and cull stems, and by using specialized mechanical equipment, such as root rakes, bulldozer or K-G blades, and drum choppers. The method used depends upon whether natural or artificial regeneration is desired, upon the size and condition of the area, and upon the amount of capital the landowner wishes to invest. Federal and state cost-share assistance and favorable tax treatment can help significantly with the cost of site preparation and reforestation of harvested woodlands.

Often a combination of site preparation methods produces the best results. Mechanical site preparation is not suitable for steep, fragile, or wet soils, as compaction and erosion can produce enough damage to offset the benefits of the operation. Burning can also be detremental on steep sites, and should be employed only when soil moisture is high enough to prevent destruction of the organic layer on the soil surface.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed.

Table 6 summarizes the forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest. In this survey, the species that produces the greatest number of cubic feet per year is the indicator species.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the soil. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, C, and S.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50

percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic feet and board feet. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands *(4, 5, 6, 7, 8, 9, 12, 15)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. For example, a productivity class of 104 means the soil can be expected to produce 7 cubic feet per acre per year at the point where mean annual increment culminates.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential (fig. 7).

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Figure 7.—This area of Congaree fine sandy loam, occasionally flooded, and Masada loam, 2 to 8 percent slopes, is used as a golf fairway.

Wildlife Habitat

John P. Edwards, biologist, Soil Conservation Service, and Jack Mason, wildlife biologist, North Carolina Wildlife Resources Commission, helped prepare this section.

Ample habitat is available in Caldwell County for a wide variety of wildlife. The mountainous area in the western and northern parts of the county includes the Pisgah National Forest as well as large wooded tracts of privately-owned land. Ruffed grouse, white-tailed deer, and some black bear and turkey inhabit this area.

The entire county is home to many species of small game including bobwhite quail, mourning dove, rabbits, squirrels, and several types of game birds, songbirds, owls, and hawks.

Caldwell County has an unusual mixture of cold and warm water fisheries. They range from the cooler mountain trout streams to the warmer Yadkin and Catawba Rivers, where such fish as catfish, largemouth bass, and stripped bass thrive.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for

satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, soybeans, barley, millet, buckwheat, cowpeas, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, switchgrass, clover, bahiagrass, trefoil, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggarweed, partridge pea, and pokeweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, and cedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, and slope. Examples of wetland plants are smartweed, wild millet, rushes, sedges, cutgrass, and cattail.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and beaver ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning doves, other species of songbirds, cottontail rabbits, red fox, and deer.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, thrushes, woodpeckers, hawks, owls, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are redwing blackbirds, ducks, herons, muskrat, bobcat, mink, beaver, and raccoon.

Table 9 rates, by species, wildlife populations, habitat, habitat trends, and habitat potentials in Caldwell County. This table is provided by the North Carolina Wildlife Resources Commission.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or

for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a

landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones, boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a groundwater aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, occasional, and frequent. *None* means that flooding is not probable; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, and *brief* if 2 to 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium

content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation and Highway Safety.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145-73 (AASHTO); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO); Liquid limit—T 89 (AASHTO); Plasticity index—T 90 (AASHTO); Moisture density, Method A—T 99 (AASHTO); Shrinkage—T 92 (AASHTO), D 427 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(18)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (16)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (18)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Appling Series

The Appling series consists of well drained soils that formed in residuum from metamorphic and igneous rocks on Piedmont uplands in the southeastern part of the county. Slope ranges from 2 to 15 percent.

Typical pedon of Appling sandy loam, 2 to 8 percent slopes; on State Road 1745, 1 mile northeast of Grace Chapel Church, in a cultivated field 120 feet southwest of road:

Ap—0 to 9 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.
BA—9 to 16 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.
Bt1—16 to 26 inches; strong brown (7.5YR 5/8) clay; few fine distinct yellowish brown (10YR 5/4) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.
Bt2—26 to 37 inches; strong brown (7.5YR 5/6) clay; many coarse distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.
BC—37 to 58 inches; yellowish red (5YR 4/6) sandy clay loam; common fine distinct pink (7.5YR 7/4) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.
C—58 to 80 inches; reddish brown (2.5YR 4/4) saprolite that crushes to sandy loam; common fine distinct pinkish gray (7.5YR 7/2) mottles; massive; very friable; strongly acid.

Appling soils have a clayey Bt horizon 18 to 40 inches thick underlain by saprolite. These soils are very strongly acid or strongly acid unless lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 5.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Few to common mottles with chroma of 3 or more are in most pedons. The Bt horizon is clay loam, sandy clay, or clay.

The C horizon is dominantly reddish brown or is variegated in shades of red, yellow, or brown saprolite that crushes to sandy loam or sandy clay loam.

Ashe Series

The Ashe series consists of somewhat excessively drained soils that formed in residuum weathered from granite gneiss. These soils are on mountain side slopes. Slope ranges from 25 to 80 percent.

Typical pedon of Ashe stony sandy loam, 25 to 40 percent slopes; in Wilson Creek Gorge on State Road 1328, 2.7 miles northwest of the intersection of State Roads 1328 and 1337, 300 feet northeast of State Road 1328 on U.S. Forest Service trail:

O—1 to 0 inches; partly decomposed forest litter.
A—0 to 7 inches; brown (10YR 4/3) stony sandy loam; weak fine granular structure; very friable; 20 percent stones of granite 10 to 20 inches in diameter; common fine roots; strongly acid; gradual smooth boundary.
Bw—7 to 17 inches; yellowish brown (10YR 5/8) gravelly sandy loam; weak very coarse granular and weak coarse subangular blocky structure; friable; 15 percent pebbles of granite; common fine roots; strongly acid; clear wavy boundary.
C—17 to 24 inches; yellowish brown (10YR 5/8) saprolite that crushes to gravelly sandy loam; common white and very dark gray mineral streaks; massive; friable; few fine roots; very strongly acid; clear wavy boundary.
Cr—24 to 36 inches; partly weathered granite gneiss that can be dug with difficulty with hand tools; partly consolidated in places; few thin seams of sandy loam in cleavage planes.
R—36 inches; hard granite gneiss bedrock.

Ashe soils have a loamy B horizon 10 to 20 inches thick underlain by saprolite. These soils are very strongly acid or strongly acid throughout. Content of stones, cobbles, or gravel ranges from 5 to 25 percent of the B horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 6. Some pedons have a thin A horizon less than 6 inches thick that has value of 3 or less.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, sandy loam, or gravelly sandy loam.

The C horizon is similar in color and texture to the B horizon.

Buncombe Series

The Buncombe series consists of excessively drained soils that formed in recent alluvium on flood plains. Slope is less than 2 percent.

Typical pedon of Buncombe loamy sand, frequently flooded; 0.3 mile south of Collettsville on North Carolina Highway 90, 0.1 mile east of the highway, 200 yards west of the Johns River:

Ap—0 to 10 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; medium acid; abrupt smooth boundary.
C1—10 to 36 inches; yellowish brown (10YR 5/4) loamy sand; single grained; loose; few fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.
C2—36 to 48 inches; yellowish brown (10YR 5/4) loamy sand; common medium faint dark yellowish brown (10YR 4/4) mottles and common fine faint dark grayish brown mottles; single grained; loose; few fine flakes of mica; common lenses of sandy loam 2 to 5 millimeters thick; strongly acid; gradual wavy boundary.
C3—48 to 62 inches; very dark grayish brown (10YR 3/2) fine sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; common

medium pockets and lenses of dark brown loamy sand; massive; very friable; few fine flakes of mica; strongly acid; clear smooth boundary.
C4—62 to 80 inches; brown (10YR 4/3) sand; single grained; loose; medium acid.

Buncombe soils have sandy horizons 40 to 60 inches thick underlain by stratified layers of sand and sandy loam. There are few to common flakes of mica throughout. These soils range from very strongly acid to medium acid throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 8, and chroma of 2 to 8. It ranges from sand to loam, or it is stratified.

Burton Series

The Burton series consists of well drained soils that formed in residuum from quartzite rock on high mountain uplands in the extreme northwestern corner of the county. Slope ranges from 25 to 40 percent.

Typical pedon of Burton stony loam, 25 to 40 percent slopes; 3 miles west of Blowing Rock, 1.2 miles south of the Watauga and Caldwell County line on U.S. Highway 221, 500 yards southwest of U.S. Highway 221, in woods:

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) stony loam; weak coarse granular structure; very friable; many fine roots; 20 percent, by volume, stones and cobbles of light color quartzite and quartz 10 to 20 inches in diameter; strongly acid; clear smooth boundary.
A2—6 to 10 inches; dark brown (10YR 3/3) stony sandy loam; weak coarse granular structure; very friable; common fine roots; 20 percent, by volume, stones and cobbles of light color quartzite and quartz 10 to 20 inches in diameter; strongly acid; clear smooth boundary.
Bw1—10 to 22 inches; brown (7.5YR 5/4) cobbly loam; weak medium subangular blocky structure; friable; common medium and coarse roots; 25 percent, by volume, cobbles and stones of light color quartzite and quartz 10 to 20 inches in diameter; medium acid; clear smooth boundary.
Bw2—22 to 30 inches; yellowish brown (10YR 5/6) cobbly loam; weak fine subangular blocky structure; friable; 20 percent, by volume, cobbles and stones of light color quartzite 10 to 20 inches in diameter; medium acid; clear smooth boundary.
R—30 inches; fractured, light color quartzite.

Burton soils have loamy horizons 20 to 40 inches thick underlain by bedrock. Stones and cobbles range from 10 to 25 percent, by volume, throughout the profile. These soils range from very strongly acid to medium acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 8. It is loam, fine sandy loam, or sandy loam, or their stony or cobbly analogs.

Some pedons have a C horizon that has colors similar to those of the B horizon. It is mixed gneiss fragments and saprolite that crushes to loam or fine sandy loam.

Cecil Series

The Cecil series consists of well drained soils that formed in residuum from metamorphic and igneous rocks on the Piedmont uplands. Slope ranges from 2 to 15 percent.

Typical pedon of Cecil sandy loam, 2 to 8 percent slopes, eroded; 4.5 miles southwest of Lenoir, in Tuttle State Forest, 0.8 mile northwest of intersection of North Carolina Highway 18 and State Road 1331, in woods 50 feet northeast of the parking lot:

O—2 to 0 inches; mixed pine and hardwood litter in various stages of decomposition.
A—0 to 6 inches; strong brown (7.5YR 5/6) sandy loam; weak medium granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.
BA—6 to 11 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.
Bt1—11 to 22 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine flakes of mica; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.
Bt2—22 to 40 inches; red (2.5YR 4/6) clay; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—40 to 52 inches; yellowish red (5YR 4/6) clay loam; common medium distinct pinkish white (5YR 8/2) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C—52 to 64 inches; yellowish red (5YR 5/6) saprolite that crushes to fine sandy loam; common medium distinct pinkish white (5YR 8/2) mottles; very strongly acid.

Cecil soils have a clayey Bt horizon 24 to 48 inches thick. These soils are very strongly acid or strongly acid throughout except where lime has been added.

The A horizon has hue of 2.5YR or 10YR, value of 4 or 5, and chroma of 2 to 8.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam.

The C horizon is yellowish red or mottled saprolite that crushes to fine sandy loam.

Chestnut Series

The Chestnut series consists of well drained soils that formed in residuum from metamorphic rocks throughout the mountain uplands. Slope ranges from 15 to 80 percent.

Typical pedon of Chestnut gravelly loam, 50 to 80 percent slopes; 2.5 miles south of Blowing Rock on the Globe Road (State Road 1367), 0.6 mile north of Tolbert Cemetery, 500 feet northwest on U.S. Forest Service trail, on north side of trail:

O—2 to 0 inches; partly decomposed organic matter and leaves, twigs, and roots.

A—0 to 6 inches; dark yellowish brown (10YR 4/4) gravelly loam, weak medium granular structure; very friable; many fine and medium roots; 20 percent pebbles of granite gneiss 1 inch to 3 inches in diameter; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—6 to 30 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; very friable; common fine roots; 20 percent pebbles of granite gneiss 1 inch to 3 inches in diameter; few fine flakes of mica; very strongly acid; clear wavy boundary.

Cr—30 to 72 inches; multicolored weathered granite gneiss that can be dug with difficulty with hand tools; few fine roots in fractures; few fine flakes of mica; very strongly acid; gradual wavy boundary.

R—72 inches; hard granite gneiss.

Chestnut soils have loamy horizons that range from 20 to 40 inches thick underlain by soft bedrock. These soils range from very strongly acid to medium acid throughout. Content of coarse fragments commonly ranges from 0 to 20 percent but may range up to 35 percent. Flakes of mica range from few to common throughout.

The A horizon has hue of 2.5YR to 10YR, value of 2 to 6, and chroma of 1 to 4. The A horizon that has value of 2 or 3 and chroma of 1 or 2 is less than 7 inches thick.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is dominantly sandy loam, fine sandy loam, loam, or their gravelly or stony analogs. Some pedons have thin subhorizons of sandy clay loam.

The C horizon is multicolored, unconsolidated saprolite weathered from granite, gneiss, or schist. The C horizon is loam, sandy loam, fine sandy loam, or their gravelly or stony analogs. Some pedons do not have a C horizon.

The Cr horizon is multicolored, partly weathered granite, gneiss, or schist that is partly consolidated but can be dug with difficulty.

Chewacla Series

The Chewacla series consists of somewhat poorly drained soils that formed in recent alluvium on flood plains. Slope is less than 2 percent.

Typical pedon of Chewacla loam, occasionally flooded; 2.5 miles southwest of Kings Creek on North Carolina Highway 18, 150 feet southeast across Lower Creek and wooden bridge, 200 feet southwest in a cultivated field:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; common fine roots; many fine and medium pores; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw1—8 to 18 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; very friable; few fine roots; many fine and medium pores; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw2—18 to 34 inches; yellowish brown (10YR 5/4) loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; clear smooth boundary.

Bg—34 to 44 inches; grayish brown (10YR 5/2) loam; common medium distinct yellowish brown (10YR 5/6) mottles and few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cg—44 to 52 inches; grayish brown (10YR 5/2) fine sandy loam; massive; friable; common fine flakes of mica; strongly acid; gradual wavy boundary.

2Cg—52 to 72 inches; mottled gray (10YR 5/1) and brown (10YR 5/3) coarse sand and gravel.

Chewacla soils have loamy B horizons 35 to 80 inches thick underlain by stratified loamy, sandy, or gravelly material. These soils range from strongly acid to slightly acid throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4. The A horizon that has value less than 4 is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. Gray colors, or mottles, indicating wetness are within 24 inches of the surface. The Bw horizon is sandy clay loam, loam, or sandy loam.

The Bg horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 or 2. It is sandy clay loam, loam, or sandy loam.

The Cg horizon is loam, fine sandy loam, sand, gravel, or cobbles. In some pedons, it is stratified with 2 or more of these textures.

Congaree Series

The Congaree series consists of well drained to moderately well drained soils that formed in recent alluvium on flood plains. Slope generally is less than 2 percent.

Typical pedon of Congaree fine sandy loam, occasionally flooded; northeast of Lenoir, 0.25 mile southwest of the junction of North Carolina Highway 268 and State Road 1504, in a field 250 yards southeast of North Carolina Highway 268:

Ap—0 to 9 inches; brown (10YR 4/3) fine sandy loam; weak coarse granular structure; very friable; few fine fibrous roots; common fine flakes of mica; strongly acid; clear smooth boundary.
C1—9 to 40 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common coarse faint dark brown (10YR 4/3) mottles; massive; friable; few fine fibrous roots; common fine flakes of mica; strongly acid; gradual smooth boundary.
C2—40 to 48 inches; mottled dark yellowish brown (10YR 4/4) and light yellowish brown (10YR 6/4) loamy sand; massive; very friable; common fine flakes of mica; strongly acid; gradual smooth boundary.
C3—48 to 60 inches; mottled dark yellowish brown (10YR 4/4), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/4) fine sandy loam; massive; very friable; common fine flakes of mica; strongly acid; gradual smooth boundary.
C4—60 to 68 inches; grayish brown (10YR 5/2) loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; very friable; common fine flakes of mica; strongly acid; gradual smooth boundary.
C5—68 to 84 inches; grayish brown (10YR 5/2) loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; common fine flakes of mica; few charcoal bits and water-rounded pebbles; strongly acid.

Congaree soils have a loamy and sandy C horizon over stratified loamy sand. These soils range from strongly acid to neutral throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. The C horizon ranges from loamy sand to sandy clay loam. In some pedons, gray mottles are below a depth of 20 inches.

Davidson Series

The Davidson series consists of well drained soils that formed in material from metamorphic and igneous rocks on ridges and side slopes. Slope ranges from 2 to 15 percent.

Typical pedon of Davidson clay loam, 2 to 8 percent slopes; 11 miles north of Lenoir, 0.2 mile west of State Road 1509, 50 yards west of Grandin Church in a cultivated area:

Ap—0 to 8 inches; dark reddish brown (5YR 3/4) clay loam; weak medium granular structure; friable, sticky; many fine roots; common fine pores; neutral; clear smooth boundary.
Bt1—8 to 42 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, sticky; thin continuous clay films on faces of peds; common fine pores; medium acid; gradual wavy boundary.
Bt2—42 to 56 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky; thin continuous clay films on faces of peds; common fine pores; medium acid; gradual wavy boundary.
Bt3—56 to 72 inches; red (2.5YR 4/8) clay; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky; few fine pebbles; medium acid.

Davidson soils have a clayey Bt horizon that extends to 60 to 100 inches or more in depth. These soils range from very strongly acid to medium acid throughout except where lime has been added.

The A horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 3 or 4. Where the value and chroma of the A horizon is 3 or less, the horizon is less than 6 inches thick.

The Bt horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 4 to 8. The lower part of the Bt horizon may contain some mottles in hue of 5YR to 10YR. The Bt horizon is clay. Some pedons have a BC horizon. It has the same color range as the Bt horizon, and the texture is clay loam or sandy clay loam.

A stone line occurs at the base of the Bt or BC horizon in some pedons.

Dogue Series

The Dogue series consists of moderately well drained soils that formed in old alluvium on low terraces. Slope ranges from 2 to 8 percent.

Typical pedon of Dogue fine sandy loam, 2 to 8 percent slopes; 7 miles north of Lenoir, 0.2 mile southwest of Patterson School, in a field 300 feet south of an old dairy barn:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; common fine roots; medium acid; clear smooth boundary.
Bt1—8 to 14 inches; brownish yellow (10YR 6/6) clay loam; weak medium subangular blocky structure; firm; few fine roots; few rounded quartz pebbles; thin

discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.
Bt2—14 to 28 inches; brownish yellow (10YR 6/6) clay loam; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; few rounded quartz pebbles; thin discontinuous clay films on vertical faces of peds; strongly acid; gradual smooth boundary.
BC—28 to 42 inches; mottled yellowish red (5YR 5/6), strong brown (7.5YR 5/8), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) clay loam; massive and weak coarse subangular blocky structure; firm; strongly acid; gradual smooth boundary.
C—42 to 60 inches; mottled light brownish gray (10YR 6/2), light gray (10YR 7/1), strong brown (7.5YR 5/8), and red (2.5YR 4/8) clay loam; massive; firm; strongly acid.

Dogue soils have a loamy Bt horizon 20 to 45 inches thick. These soils are very strongly acid or strongly acid throughout except where lime has been added.

The A horizon has hue of 2.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon has hue of 2.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. Mottles in shades of gray, brown, or red are in the lower part of the Bt horizon. The Bt horizon is clay loam or clay.

The C horizon is similar in color to the Bt horizon, or it is mottled. The C horizon ranges from sand to clay.

Edneyville Series

The Edneyville series consists of well drained soils that formed in residuum from metamorphic rock in mountainous areas on uplands. Slope ranges from 15 to 50 percent.

Typical pedon of Edneyville loam, from an area of Chestnut and Edneyville soils, 25 to 50 percent slopes; 14 miles north of Lenoir, 200 yards northwest of Bailey Camp Church, in woods 15 feet west of State Road 1500:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; very friable; many fine roots; few fine flakes of mica; many fine pores; strongly acid; clear smooth boundary.
A2—3 to 7 inches; dark yellowish brown (10YR 4/4) loam; weak medium granular structure; very friable; common fine roots; few fine flakes of mica; many fine pores; strongly acid; clear smooth boundary.
BA—7 to 11 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; many fine pores; strongly acid; gradual smooth boundary.
Bw—11 to 28 inches; yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; friable; few fine flakes of mica; many fine pores; very strongly acid; gradual smooth boundary.
BC—28 to 38 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; few fine flakes of mica; many fine pores; strongly acid; gradual wavy boundary.
C—38 to 62 inches; yellowish brown (10YR 5/4) saprolite that crushes to fine sandy loam; massive; few fine flakes of mica; very strongly acid.

Edneyville soils have a loamy B horizon 15 to 32 inches thick. These soils range from very strongly acid to medium acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. If the A horizon has value of 3 or less, it is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. It is loam or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 6. It is saprolite that crushes to loam or fine sandy loam.

Evard Series

The Evard series consists of well drained soils that formed in residuum weathered from metamorphic rock on the mountain uplands. Slope ranges from 15 to 60 percent.

Typical pedon of Evard fine sandy loam, from an area of Evard and Saluda fine sandy loams, 25 to 60 percent slopes; 5 miles northeast of Patterson, 0.6 mile north of the junction of State Roads 1504 and 1557, 100 feet west of State Road 1557:

O—1 to 0 inches; partly decomposed organic material.
A—0 to 3 inches; dark brown (10YR 3/3) fine sandy loam; weak medium granular structure; very friable; many fine roots; few fine pebbles; strongly acid; abrupt smooth boundary.
E—3 to 6 inches; brown (7.5YR 4/4) fine sandy loam; weak medium granular structure; very friable; many fine roots; few fine pebbles; very strongly acid; clear smooth boundary.
BE—6 to 10 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few fine pebbles; very strongly acid; clear smooth boundary.
Bt—10 to 28 inches; yellowish red (5YR 4/8) clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; few (2 percent) quartz pebbles 1 to 3 inches in diameter; thin discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.
BC—28 to 34 inches; red (2.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—34 to 80 inches; mottled yellowish red (5YR 4/6), reddish yellow (5YR 6/6), and light gray (5YR 7/1) saprolite that crushes to sandy loam; massive; friable; very strongly acid.

Evard soils have a loamy Bt horizon 12 to 28 inches thick. Quartz fragments range from 0 to 15 percent, by volume, throughout the profile. Flakes of mica range from few to common. These soils are very strongly acid or strongly acid throughout except in areas where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It is fine sandy loam or sandy loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The C horizon has colors similar to those of the Bt horizon and is saprolite that crushes to sandy loam or loam.

Hayesville Series

The Hayesville series consists of well drained soils that formed in residuum from metamorphic rock on mountain uplands. Slope ranges from 8 to 25 percent.

Typical pedon of Hayesville fine sandy loam, 8 to 15 percent slopes; 7 miles east of Lenoir, 0.9 mile north of the intersection of State Roads 1733 and 1730, in cutover woods on logging road, 0.3 mile west of State Road 1733:

A—0 to 5 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium granular structure; very friable; many fine roots; few fine flakes of mica; strongly acid; abrupt smooth boundary.

E—5 to 7 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine and medium granular structure; very friable; common fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

BA—7 to 10 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; few (2 percent) quartz pebbles; strongly acid; clear smooth boundary.

Bt1—10 to 18 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine flakes of mica; thin continuous clay films on faces of peds; few (2 percent) quartz pebbles; strongly acid; clear smooth boundary.

Bt2—18 to 32 inches; red (10R 4/8) clay; moderate medium subangular blocky structure; firm; few fine flakes of mica; thin continuous clay films on faces of peds; few (2 percent) quartz pebbles; strongly acid; gradual wavy boundary.

BC—32 to 55 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica and quartz pebbles; very strongly acid; gradual wavy boundary.

C—55 to 64 inches; reddish yellow (5YR 6/8) saprolite that crushes to fine sandy loam; very strongly acid.

Hayesville soils have a clayey Bt horizon 15 to 45 inches thick. Content of coarse fragments ranges from 0 to 25 percent in the A horizon and 0 to 15 percent in the B and C horizons. These soils are very strongly acid or strongly acid throughout except in areas where lime has been added.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or clay.

The C horizon is saprolite that crushes to loam or fine sandy loam.

Hibriten Series

The Hibriten series consists of well drained soils that formed in residuum weathered from metamorphic rocks on Piedmont uplands. Slope ranges from 8 to 60 percent.

Typical pedon of Hibriten very cobbly sandy loam, 8 to 15 percent slopes; 8 miles east of Lenoir on North Carolina Highway 90, 1.9 miles south on State Road 1734, 0.3 mile southwest on State Road 1735 on a farm road, 1.1 miles west to a field road, 0.4 mile north, 75 feet east of road:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam; weak fine granular structure; very friable; 40 percent, by volume, fragments of sillimanite schist; many fine and medium roots; few medium flakes of mica; very strongly acid; abrupt smooth boundary.

A2—2 to 8 inches; brown (10YR 4/3) very cobbly sandy loam; moderate medium granular structure; very friable; 40 percent, by volume, fragments of sillimanite schist; few fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

BA—8 to 12 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; weak very coarse granular structure; very friable; 60 percent, by volume, fragments of sillimanite schist; few medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt—12 to 24 inches; yellowish red (5YR 4/6) very cobbly sandy clay loam; friable; 60 percent, by volume, fragments of sillimanite schist; few fine and medium

flakes of mica; very strongly acid; clear smooth boundary.
Cr—24 to 48 inches; reddish brown (5YR 4/4), brownish yellow (10YR 6/6), and brown (10YR 5/3) shattered, weathered sillimanite schist that can be dug with difficulty with hand tools; very strongly acid; clear irregular boundary.
R—48 inches; hard, fractured sillimanite schist.

Thickness of the Bt horizon ranges from 6 to 10 inches. These soils are very strongly acid or strongly acid throughout except where lime has been added. Content of coarse fragments in the A and B horizons ranges from 35 to 75 percent. Most pedons have few to common flakes of mica.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. The A horizon that has value or chroma of 3 or less is less than 6 inches thick.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. The fine-earth fraction of the Bt horizon is sandy clay loam or clay loam.

The Cr horizon is multicolored, partly weathered sillimanite schist with occasional interbeds of mica schist and granite gneiss. Soil material often extends downward into nearly vertical cracks in this horizon. In some pedons, the Cr horizon is very thin or nonexistent and the Bt horizon is directly over bedrock.

Masada Series

The Masada series consists of well drained soils that formed in alluvium on stream terraces. Slope ranges from 2 to 15 percent.

Typical pedon of Masada loam, 2 to 8 percent slopes; 1 mile southwest of Patterson School, in a cultivated field 200 feet south of North Carolina Highway 268, 200 feet northeast of farm house:

Ap—0 to 10 inches; brown (7.5YR 4/4) loam; weak medium granular structure; very friable; common fine roots; few fine flakes of mica; strongly acid; abrupt smooth boundary.
Bt1—10 to 26 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.
Bt2—26 to 42 inches; strong brown (7.5YR 5/6) clay loam; common fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.
BC—42 to 58 inches; yellowish red (5YR 5/6) sandy clay loam; common fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; few fine flakes of mica; strongly acid; clear wavy boundary.
C—58 to 72 inches; mottled strong brown (7.5YR 5/6) and light gray (10YR 7/2) gravelly sandy loam; massive; very friable; common fine flakes of mica; 15 percent, by volume, rounded pebbles of quartz; strongly acid.

Masada soils have a loamy Bt horizon 15 to 40 inches thick. Content of coarse fragments ranges from 0 to 10 percent in the A and B horizons and up to 25 percent in the C horizon. Few to common flakes of mica are throughout. These soils are very strongly acid or strongly acid throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay or clay loam.

The C horizon is commonly mottled in shades of brown to gray. It is sandy loam to sandy clay loam or their gravelly analogs.

Pacolet Series

The Pacolet series consists of well drained soils that formed in residuum from metamorphic and igneous rocks on Piedmont uplands. Slope ranges from 15 to 40 percent.

Typical pedon of Pacolet fine sandy loam, 25 to 40 percent slopes; on State Road 1817, 2.1 miles southeast of Granite Falls, 0.7 mile southeast of junction of State Roads 1751 and 1817, in woods 75 feet north of State Road 1817:

O1—2 to 1 inches; mixed hardwood litter.
O2—1 to 0 inches; partly decomposed hardwood litter and leaves.
A—0 to 2 inches; reddish brown (5YR 4/3) fine sandy loam; moderate fine and medium granular structure; very friable; many medium and fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.
BA—2 to 6 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; many medium and fine roots; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bt—6 to 24 inches; red (2.5YR 4/6) clay; moderate medium and fine subangular blocky structure; firm; common fine roots; common fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—24 to 36 inches; red (2.5YR 4/8) loam; weak fine subangular blocky structure; friable; few fine roots; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C—36 to 80 inches; mottled light brown (7.5YR 6/4) and light reddish brown (5YR 6/4) saprolite that crushes to fine sandy loam; many fine flakes of mica; very strongly acid.

Pacolet soils have a clayey Bt horizon 12 to 24 inches thick. These soils range from very strongly acid to medium acid throughout except where lime has been added. Mica content ranges from few to many flakes.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. If the A horizon has value less than 4, it is less than 6 inches thick.

The Bt horizon has hue of 10R or 2.5YR, except the upper part can have hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay, sandy clay, or clay loam.

The C horizon is mottled in shades of yellow, brown, or red saprolite that crushes to sandy loam or fine sandy loam.

Potomac Series

The Potomac series consists of somewhat excessively drained soils that formed in recent alluvium on flood plains. Slope is less than 4 percent.

Typical pedon of Potomac very cobbly loamy sand, frequently flooded; 0.75 mile south of Edgemont on North Carolina Highway 90 to where road turns east, in woods 100 feet north of road:

A—0 to 2 inches; dark brown (10YR 3/3) very cobbly loamy sand; weak medium granular structure; loose; common fine roots; 50 percent, by volume, rounded gneiss and quartz cobbles; strongly acid; clear smooth boundary.

C1—2 to 8 inches; brown (10YR 5/3) very cobbly sand; single grained; loose; common fine roots; 50 percent, by volume, rounded gneiss and quartz cobbles; strongly acid; clear smooth boundary.

C2—8 to 20 inches; brown (10YR 5/3) very cobbly sand; single grained; loose; 60 percent, by volume, rounded gneiss and quartz cobbles and stones; strongly acid; clear smooth boundary.

C3—20 to 40 inches; yellowish brown (10YR 5/4) very cobbly sand; single grained; loose; 60 percent, by volume, rounded gneiss and quartz cobbles and stones; strongly acid.

C4—40 to 60 inches; yellowish brown (10YR 5/4) extremely cobbly sand; single grained; loose; 80 percent, by volume, rounded gneiss and quartz cobbles and stones; strongly acid.

Potomac soils are a stratified mixture of sands, loamy sands, and sandy loams combined with gravels and cobbles. These soils range from strongly acid to neutral throughout. The content of gravels and cobbles ranges from 10 to 50 percent in the A horizon and from 35 to 80 percent in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4.

Rion Series

The Rion series consists of well drained soils that formed in residuum from metamorphic rock on Piedmont uplands. Slope ranges from 15 to 40 percent.

Typical pedon of Rion sandy loam, 25 to 40 percent slopes; 2 miles north of Kings Creek, in woods 75 feet east of State Road 1510 where Kings Creek meets State Road 1510:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; many fine and medium roots; few (2 percent) angular quartz pebbles; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

A2—2 to 7 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; common fine and medium roots; few fine flakes of mica; few (2 percent) angular quartz pebbles; strongly acid; clear smooth boundary.

BA—7 to 10 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few (2 percent) quartz pebbles; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt—10 to 20 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine flakes of mica; few (2 percent) angular quartz pebbles; strongly acid; clear smooth boundary.

BC—20 to 32 inches; brown (7.5YR 5/4) sandy loam; weak medium subangular blocky structure and massive; friable; common fine flakes of mica; few large areas of saprolite (about 15 percent); strongly acid; gradual wavy boundary.

C—32 to 60 inches; brown (7.5YR 5/4) saprolite that crushes to sandy loam; many medium streaks of dark grayish brown and white; very strongly acid.

Rion soils have a loamy Bt horizon 10 to 40 inches thick underlain by sandy loam saprolite. This soil is very strongly acid or strongly acid throughout except where lime has been added. Content of coarse fragments ranges from 0 to 15 percent throughout the soil.

The A horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6. Some pedons have a thin A1 horizon that is less than 6 inches thick and that has value of 3 or less.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have mottles in shades of red, brown, or yellow. The Bt horizon is loam, sandy clay loam, or clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. Some pedons have mottles in shades of red, brown, gray, or white. The C horizon is sandy loam or fine sandy loam.

Roanoke Series

The Roanoke series consists of poorly drained soils that formed in old alluvium on low terraces. Slope is less than 2 percent.

Typical pedon of Roanoke loam; 7 miles north of Lenoir, 0.2 mile southwest of Patterson School, 400 feet southwest of old dairy barn:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; many medium and fine roots; medium acid; abrupt smooth boundary.

Btg1—7 to 26 inches; grayish brown (10YR 5/2) clay; common fine distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; very strongly acid; gradual smooth boundary.

Btg2—26 to 38 inches; gray (10YR 5/1) clay; many medium distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm; very strongly acid; gradual smooth boundary.

BCg—38 to 45 inches; light brownish gray (10YR 6/2) clay loam; many medium distinct strong brown (7.5YR 5/8) mottles and common coarse faint gray (10YR 5/1) mottles; weak coarse subangular blocky structure; firm; very strongly acid; clear smooth boundary.

Cg—45 to 58 inches; mottled light gray (N 7/0), reddish yellow, (7.5YR 6/6), yellowish red (5YR 5/8), and gray (10YR 5/1) clay loam; massive; friable; common sand-size quartz particles in lower part; very strongly acid; clear smooth boundary.

IICg—58 to 80 inches; greenish gray (5G 5/1) sandy loam; massive; very friable; few rounded quartz 1 to 2 inches in diameter; neutral.

Roanoke soils have a clayey Bt horizon 15 to 40 inches thick underlain by massive clay to cobbly sand. These soils are very strongly acid to strongly acid except where lime has been added.

The A horizon has hue of 10YR to 5Y, value of 2 to 6, and chroma of 1 or 2.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Some pedons have mottles in shades of red, brown, and yellow. The Btg horizon is clay or clay loam.

The Cg horizon generally is mottled in shades of gray, brown, and red. The texture is variable, ranging from clay to cobbly sand.

Saluda Series

The Saluda series consists of well drained soils that formed in residuum from metamorphic rock on mountain uplands. Slope ranges from 25 to 60 percent.

Typical pedon of Saluda fine sandy loam, from an area of Evard and Saluda fine sandy loams, 25 to 60 percent slopes; 5 miles north of Lenoir, 0.4 mile north of the intersection of State Roads 1504 and 1557, in cutover woods 1,800 feet north of State Road 1504:

A—0 to 6 inches; brown (7.5YR 5/4) fine sandy loam; weak medium granular structure; very friable; many fine roots; common medium and coarse flakes of mica; strongly acid; clear smooth boundary.

Bt—6 to 18 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular structure; friable; thin discontinuous clay films on vertical faces of peds; common medium flakes of mica; few (2 percent) schist fragments; strongly acid; gradual irregular boundary.

Cr—18 to 65 inches; yellowish red (5YR 4/6) partly weathered mica gneiss that can be dug with difficulty with hand tools; massive; partly consolidated in places but can be dug with equipment.

Saluda soils have a loamy Bt horizon 8 to 16 inches thick underlain by partly weathered rock. Coarse fragments are few to common. These soils are very strongly acid or strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The Cr horizon is yellowish red or is mottled in shades of red, brown, or yellow. It ranges from sandy loam saprolite to partly weathered rock.

State Series

The State series consists of well drained soils that formed in alluvium on low terraces. Slope ranges from 2 to 8 percent.

Typical pedon of State loam, 2 to 8 percent slopes; 0.6 mile southwest of Patterson School, 500 yards south of North Carolina Highway 268, in a cultivated field 200 yards north of the Yadkin River:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; common fine roots and pores; few fine flakes of mica; strongly acid; abrupt smooth boundary.

BA—8 to 14 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt—14 to 36 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; thin discontinuous clay film on vertical faces of peds; strongly acid; gradual wavy boundary.

BC—36 to 48 inches; strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; few fine flakes of mica; few fine rounded quartz fragments; strongly acid; gradual wavy boundary.
C—48 to 60 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.
2C—60 to 80 inches; brown (10YR 5/3) loamy sand; massive; friable; strongly acid.

State soils have a loamy Bt horizon 10 to 35 inches thick underlain by stratified loamy material, sand, or gravel. These soils are very strongly acid or strongly acid throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The C or 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. The C horizon is fine sandy loam or loam. The 2C horizon is loamy sand or sand.

Tate Series

The Tate series consists of well drained soils that formed in colluvium in draws and coves and on benches and foot slopes in the mountains. Slope ranges from 2 to 25 percent.

Typical pedon of Tate fine sandy loam, 8 to 25 percent slopes; 2.5 miles south of Blowing Rock, 300 yards west of Globe Road (State Road 1367), in woods 20 feet west of U.S. Forest Service road:

A—0 to 4 inches; brown (10YR 4/3) fine sandy loam; moderate medium granular structure; very friable; few (2 percent) quartz pebbles up to 3 inches in diameter; many fine roots and pores; medium acid; clear smooth boundary.
E—4 to 12 inches; brown (7.5YR 4/4) loam; moderate medium granular structure; very friable; few (2 percent) quartz pebbles up to 3 inches in diameter; many fine roots and pores; medium acid; clear smooth boundary.
BA—12 to 16 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.
Bt—16 to 30 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.
BC—30 to 48 inches; brown (7.5YR 4/4) fine sandy loam; few fine faint very pale brown mottles; weak medium subangular blocky structure; few fine flakes of mica; strongly acid; gradual wavy boundary.
C—48 to 60 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common medium distinct very pale brown (10YR 7/3) mottles; few (5 percent) quartz pebbles up to 3 inches in diameter; massive; very strongly acid.

Tate soils have a loamy Bt horizon 10 to 40 inches thick. The content of coarse fragments ranges from 0 to 15 percent, by volume, in the A and B horizons and from 5 to 25 percent in the C horizon. These soils range from very strongly acid to medium acid throughout except where lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4. An A horizon that has value of 3 or less is less than 7 inches thick.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, clay loam, or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8. It is fine sandy loam or sandy loam.

Wehadkee Series

The Wehadkee series consists of poorly drained soils that formed in recent alluvium on flood plains. Slope is less than 2 percent.

Typical pedon of Wehadkee loam, frequently flooded; 5 miles southwest of Kings Creek on North Carolina Highway 18, across the road from Cedar Rock Country Club, in a pasture 40 yards north of North Carolina Highway 18:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam; few fine distinct reddish brown (2.5YR 4/4) mottles; weak medium granular structure; very friable; many fine roots; common wormholes; slightly acid; abrupt smooth boundary.
C1—10 to 20 inches; dark grayish brown (10YR 4/2) clay loam; common fine distinct reddish brown (2.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; common fine roots; common wormholes; slightly acid; clear smooth boundary.
C2—20 to 28 inches; mottled strong brown (7.5YR 5/6), grayish brown (10YR 5/2) and reddish brown (2.5YR 5/4) clay loam; massive; friable; strongly acid; clear wavy boundary.
C3—28 to 37 inches; dark gray (10YR 4/1) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles and few fine distinct reddish brown (2.5YR 5/4) mottles; massive; friable; strongly acid; abrupt wavy boundary.
C4—37 to 80 inches; gray (N 5/0) stratified sandy loam and sand.

Wehadkee soils have a loamy horizon 30 to more than 60 inches thick underlain by stratified sandy or gravelly material. These soils range from strongly acid to slightly acid throughout except where lime has been added.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4, or it is neutral and has value of 3 to 6. Mottles are in shades of yellow or brown. The C horizon is sandy clay loam, clay loam, or loam. The lower part of the C horizon is stratified loam, sandy loam, loamy sand, sand, or gravel.

References

(1) Alexander, Nancy. 1956. Here will I dwell (The story of Caldwell County). pp. 7-16, illus.

(2) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vol., illus.

(3) American Society for Testing and Materials. 1986. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(4) Briscoe, C.B. and M.D. Ferrill. 1958. Height growth of American sycamore in southeastern Louisiana. La. State Univ. Agr. Exp. Stn. Res. Rel., LSU Forest. Note 19.

(5) Broadfoot, Walter M. and R.M. Krinard. 1959. Guide for evaluating sweetgum sites. U.S. Dep. Agr., Forest Serv., South. Forest Exp. Stn. Occas. Pap. 176, 8 pp., illus.

(6) Broadfoot, Walter M. 1963. Guide for evaluating water oak sites. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Pap. SO-1, 8 pp., illus.

(7) Coile, T.S. and F.X. Schumacher. 1953. Site index of young stands of loblolly and shortleaf pines in the Piedmont Plateau Region. J. For. 51: 432-435, illus.

(8) Doolittle, Warren T. 1957. Site index curves for yellow poplar in the Southern Appalachians. U.S. Dep. Agric., Forest Serv., Southeast. Forest Exp. Stn. Res.

(9) Doolittle, Warren T. 1960. Site index curves for natural stands of white pine in the Southern Appalachians. U.S. Dep. Agric., Forest Serv., Southeast. Forest Exp. Stn. Res. Note 141.

(10) Little, Elbert L., Jr. 1979. Checklist of United States trees (native and naturalized). U.S. Dept. of Agric. Forest Serv., Agric. Handb. No. 541, 375 pp., illus.

(11) North Carolina Division of Forest Resources. Forest practices guidelines related to water quality. Dep. Nat. Res. and Community Dev., pp. 8-24, illus.

(12) Olson, D.J. 1959. Site index curves for upland oak in the southeast. U.S. Dep. Agric. Forest Serv., Southeast. Forest Exp. Stn. Res. Note 125, 2 pp.

(13) Radford, Albert E., H.E. Ahles, C.R. Bell. 1983. Manual of the vascular flora of the Carolinas. Univ. of N.C., 1,183 pp., illus.

(14) Sharpe, Bill. 1965. A new geography of North Carolina. Vol. II, pp. 675-700, illus.

(15) Tennessee Valley Authority. 1948. Site curves for eastern redcedar. (Unpublished, processed curves based on 271 observations from plots thoughout the Tennessee Valley).

(16) United States Department of Agriculture. 1951 (Being revised). Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-188 issued May 1962.)

(17) United States Department of Agriculture. 1965. Silvics of forest trees of the United States. U.S. Dep. Agric. Handb. 271, 762 pp., illus.

(18) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(19) United States Department of Agriculture. 1981. Yellow poplar: Characteristics and management. Forest Serv. Handb. 583, p. 16, illus.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected

scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage

results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

Fragile (in tables). The soil is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.
R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rocks. Rock formed by solidifiction of molten rock; generally crystalline in nature.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments that are 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mulch. Dark colored, finely divided, well decomposed organic soil material.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction

because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has

properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). An excessive amount of toxic substances in the soil, such as sodium or sulfur, severely hinders the establishment of vegetation or severely restricts plant growth.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-79 at Lenoir, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	50.7	27.5	39.1	73	3	26	3.63	2.41	4.74	7	2.2
February---	54.1	29.2	41.7	74	7	25	4.13	2.14	5.86	7	3.2
March------	62.4	36.0	49.2	82	16	109	4.94	2.98	6.69	8	1.8
April------	72.9	44.7	58.8	90	26	268	4.14	2.24	5.80	7	0.0
May--------	79.3	52.8	66.1	92	33	499	4.11	1.87	6.02	7	0.0
June-------	84.8	59.8	72.3	96	43	669	4.57	2.62	6.28	8	0.0
July-------	87.5	63.5	75.5	97	52	791	4.84	2.61	6.80	8	0.0
August-----	86.9	62.8	74.9	96	51	772	4.33	2.07	6.26	8	0.0
September--	81.4	57.1	69.3	94	39	579	4.66	2.15	6.82	6	0.0
October----	72.5	45.3	58.9	88	25	281	3.84	1.28	5.93	5	0.0
November---	62.1	36.0	49.1	81	15	74	3.27	1.70	4.63	6	0.0
December---	53.1	29.4	41.3	72	8	21	3.74	1.53	5.60	6	1.1
Yearly:											
Average--	70.6	45.3	58.0	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	3	---	---	---	---	---	---
Total----	---	---	---	---	---	4,114	50.20	43.36	57.33	83	8.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-79
at Lenoir, North Carolina]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 5	April 13	May 2
2 years in 10 later than--	March 29	April 7	April 27
5 years in 10 later than--	March 14	March 27	April 16
First freezing temperature in fall:			
1 year in 10 earlier than--	October 27	October 19	October 7
2 years in 10 earlier than--	November 2	October 24	October 11
5 years in 10 earlier than--	November 12	November 3	October 20

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-79
at Lenoir, North Carolina]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	212	198	167
8 years in 10	222	205	173
5 years in 10	242	220	186
2 years in 10	261	234	199
1 year in 10	271	241	206

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
ApB	Appling sandy loam, 2 to 8 percent slopes	474	0.2
ApD	Appling sandy loam, 8 to 15 percent slopes	1,245	0.4
AsF	Ashe stony sandy loam, 25 to 40 percent slopes	559	0.2
AsG	Ashe stony sandy loam, 40 to 80 percent slopes	1,045	0.3
Bn	Buncombe loamy sand, frequently flooded	1,040	0.3
BtF	Burton stony loam, 25 to 40 percent slopes	1,010	0.3
CeB2	Cecil sandy loam, 2 to 8 percent slopes, eroded	15,056	5.0
CeD2	Cecil sandy loam, 8 to 15 percent slopes, eroded	37,373	12.4
CfB2	Cecil-Urban land complex, 2 to 8 percent slopes, eroded	2,930	1.0
CfD2	Cecil-Urban land complex, 8 to 15 percent slopes, eroded	2,524	0.8
ChG	Chestnut gravelly loam, 50 to 80 percent slopes	37,545	12.5
CKE	Chestnut and Edneyville soils, 15 to 25 percent slopes	5,861	1.9
CKF	Chestnut and Edneyville soils, 25 to 50 percent slopes	36,352	12.1
Cm	Chewacla loam, occasionally flooded	8,874	2.9
Co	Congaree fine sandy loam, occasionally flooded	4,492	1.5
DnB	Davidson clay loam, 2 to 8 percent slopes	227	0.1
DnD	Davidson clay loam, 8 to 15 percent slopes	184	0.1
DoB	Doque fine sandy loam, 2 to 8 percent slopes	1,084	0.4
EaE	Evard fine sandy loam, 15 to 25 percent slopes	11,044	3.7
EaF	Evard fine sandy loam, 25 to 50 percent slopes	23,179	7.7
ESF	Evard and Saluda fine sandy loams, 25 to 60 percent slopes	12,921	4.3
HaD	Hayesville fine sandy loam, 8 to 15 percent slopes	1,875	0.6
HaE	Hayesville fine sandy loam, 15 to 25 percent slopes	2,203	0.7
HbD	Hibriten very cobbly sandy loam, 8 to 15 percent slopes	1,254	0.4
HbF	Hibriten very cobbly sandy loam, 15 to 60 percent slopes	8,179	2.7
MaB	Masada loam, 2 to 8 percent slopes	2,508	0.8
MaD	Masada loam, 8 to 15 percent slopes	4,015	1.3
PaE	Pacolet fine sandy loam, 15 to 25 percent slopes	34,879	11.6
PaF	Pacolet fine sandy loam, 25 to 40 percent slopes	21,879	7.3
Po	Potomac very cobbly loamy sand, frequently flooded	662	0.2
Pt	Pits, Quarries	96	*
RnE	Rion sandy loam, 15 to 25 percent slopes	1,406	0.5
RnF	Rion sandy loam, 25 to 40 percent slopes	5,501	1.8
Ro	Roanoke loam	201	0.1
RSF	Rock outcrop-Ashe complex, 25 to 80 percent slopes	2,244	0.7
SeB	State loam, 2 to 8 percent slopes	1,077	0.4
TaB	Tate fine sandy loam, 2 to 8 percent slopes	260	0.1
TaE	Tate fine sandy loam, 8 to 25 percent slopes	2,639	0.9
UaB	Urban land-Arents complex, occasionally flooded	684	0.2
UmC	Urban land-Masada complex, 2 to 15 percent slopes	682	0.2
Wk	Wehadkee loam, frequently flooded	2,161	0.7
	Water	2,125	0.7
	Total	301,549	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Tons	AUM*
ApB---------- Appling	IIe	100	3,500	50	35	3.0	5.5
ApD---------- Appling	IVe	80	3,200	40	30	2.6	4.5
AsF, AsG-------- Ashe	VIIs	---	---	---	---	---	---
Bn---------- Buncombe	Vw	60	---	---	---	1.5	3.0
BtF---------- Burton	VIs	---	---	---	---	---	5.0
CeB2---------- Cecil	IIe	70	3,000	---	30	2.6	4.5
CeD2---------- Cecil	IVe	65	2,800	---	25	2.5	4.0
CfB2---------- Cecil-Urban land	---	---	---	---	---	---	---
CfD2---------- Cecil-Urban land	---	---	---	---	---	---	---
ChG---------- Chestnut	VIIe	---	---	---	---	---	---
CKE:							
Chestnut-------	VIe	---	---	---	---	2.5	---
Edneyville-----	VIe	---	---	---	---	---	---
CKF:							
Chestnut-------	VIIe	---	---	---	---	---	---
Edneyville-----	VIe	---	---	---	---	---	---
Cm---------- Chewacla	IIIw	110	---	---	45	5.0	8.0
Co---------- Congaree	IIw	120	---	---	45	4.0	6.5
DnB---------- Davidson	IIIe	75	3,200	---	32	3.5	6.0
DnD---------- Davidson	VIe	70	3,000	---	30	3.0	5.0
DoB---------- Dogue	IIe	65	---	55	28	3.0	5.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Tons	AUM*
EaE---------- Evard	VIe	---	---	---	---	---	---
EaF---------- Evard	VIIe	---	---	---	---	---	---
ESF---------- Evard and Saluda	VIIe	---	---	---	---	---	---
HaD---------- Hayesville	IVe	80	2,100	45	---	3.0	---
HaE---------- Hayesville	VIe	---	---	---	---	---	---
HbD---------- Hibriten	VIs	---	---	---	---	---	4.0
HbF---------- Hibriten	VIIs	---	---	---	---	---	3.0
MaB---------- Masada	IIe	70	3,000	50	30	3.0	5.0
MaD---------- Masada	IIIe	65	2,800	50	25	2.5	4.5
PaE---------- Pacolet	VIe	---	---	---	---	2.3	3.8
PaF---------- Pacolet	VIIe	---	---	---	---	---	---
Po---------- Potomac	Vw	---	---	---	---	---	---
Pt. Pits							
RnE---------- Rion	VIe	---	---	---	---	2.0	3.6
RnF---------- Rion	VIIe	---	---	---	---	---	---
Ro---------- Roanoke	IVw	---	---	---	---	2.0	5.0
RSF:							
Rock outcrop---	VIIIs	---	---	---	---	---	---
Ashe----------	VIIs	---	---	---	---	---	---
SeB---------- State	IIe	110	2,700	60	43	4.0	6.5
TaB---------- Tate	IIe	110	2,600	65	---	4.0	6.5

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
		Bu	Lbs	Bu	Bu	Tons	AUM*
TaE---------- Tate	VIe	---	---	---	---	3.0	5.0
UaB---------- Urban land-Arents	---	---	---	---	---	---	---
UmC---------- Urban land-Masada	---	---	---	---	---	---	---
Wk---------- Wehadkee	VIw	---	---	---	---	3.5	6.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
ApB, ApD---------- Appling	8A	Slight	Slight	Slight	Shortleaf pine------	65	99	Eastern white pine, loblolly pine, hardwoods 1/.
					Scarlet oak---------	68	50	
					Southern red oak----	76	58	
					Virginia pine-------	74	114	
					White oak-----------	71	53	
					Yellow-poplar-------	80	71	
					Black oak-----------	---	---	
					Hickory-------------	---	---	
AsF---------- Ashe	11R	Moderate	Moderate	Moderate	Chestnut oak--------	---	---	Eastern white pine, shortleaf pine, hardwoods 1/.
					Scarlet oak---------	---	---	
					Yellow-poplar-------	78	68	
					Eastern white pine--	84	155	
					Northern red oak----	---	---	
					Pitch pine----------	---	---	
					Shortleaf pine------	56	80	
					Virginia pine-------	62	95	
					Mountain pine-------	---	---	
AsG---------- Ashe	11R	Severe	Severe	Severe	Chestnut oak--------	---	---	Eastern white pine, shortleaf pine, hardwoods 1/.
					Scarlet oak---------	---	---	
					Yellow-poplar-------	78	68	
					Eastern white pine--	84	155	
					Northern red oak----	---	---	
					Pitch pine----------	---	---	
					Shortleaf pine------	56	80	
					Virginia pine-------	62	95	
Bn---------- Buncombe	6S	Slight	Moderate	Moderate	American sycamore---	90	80	Loblolly pine, eastern white pine, hardwoods 1/.
					Yellow-poplar-------	100	100	
BtF---------- Burton	---	Moderate	Moderate	Moderate	Fraser fir----------	---	---	Fraser fir 2/.
					Red spruce----------	---	---	
					American beech------	---	---	
					Pin cherry----------	---	---	
					American mountainash	---	---	
					Yellow birch--------	---	---	
					Cucumbertree--------	---	---	
					Fraser magnolia-----	---	---	
CeB2, CeD2--------- Cecil	10A	Slight	Slight	Slight	Eastern white pine--	80	144	Eastern white pine, loblolly pine, hardwoods 1/.
					Shortleaf pine------	69	108	
					Virginia pine-------	73	113	
					Black oak-----------	66	48	
					Northern red oak----	82	64	
					Scarlet oak---------	80	62	
					Southern red oak----	---	---	
					White oak-----------	---	---	
					Yellow-poplar-------	---	---	
					Hickory-------------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
ChG---------- Chestnut	11R	Severe	Severe	Slight	Northern red oak----	65	47	Shortleaf pine, eastern white pine, Fraser fir 2/, Norway spruce 2/, hardwoods 1/.
					Shortleaf pine------	65	99	
					Chestnut oak--------	---	---	
					Eastern white pine--	88	162	
					Yellow-poplar-------	95	98	
					Pitch pine----------	60	88	
					Scarlet oak---------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Yellow birch--------	---	---	
					Sweet birch---------	---	---	
					White pine----------	---	---	
					Virginia pine-------	---	---	
CKE, CKF:								
Chestnut----------	11R	Moderate	Moderate	Slight	Shortleaf pine------	65	99	Shortleaf pine, eastern white pine, Fraser fir 2/, Norway spruce 2/, hardwoods 1/.
					Chestnut oak--------	72	54	
					Eastern white pine--	83	151	
					Pitch pine----------	68	106	
					Scarlet oak---------	72	54	
					White oak-----------	65	47	
					Black oak-----------	72	54	
Edneyville--------	12R	Slight	Moderate	Moderate	Northern red oak----	82	64	Eastern white pine, shortleaf pine, Noraway spruce 2/, Fraser fir 2/, hardwoods 1/.
					Yellow-poplar-------	95	98	
					Shortleaf pine------	75	120	
					Eastern white pine--	92	170	
Cm---------- Chewacla	7W	Slight	Moderate	Slight	Yellow-poplar-------	96	100	Loblolly pine, eastern white pine, black walnut, hardwoods 1/.
					American sycamore---	---	---	
					Green ash-----------	---	---	
					Black walnut--------	---	---	
					Sycamore------------	---	---	
					Red maple-----------	---	---	
					River birch---------	---	---	
					Shortleaf pine------	---	---	
Co---------- Congaree	7A	Slight	Slight	Slight	Yellow-poplar-------	98	104	Loblolly pine, eastern white pine, black walnut, hardwoods 1/
					American sycamore---	89	---	
					Black walnut--------	---	---	
					Red maple-----------	---	---	
					Green ash-----------	---	---	
					River birch---------	---	---	
DnB, DnD---------- Davidson	8C	Moderate	Slight	Slight	Loblolly pine-------	81	112	Loblolly pine, hardwoods 1/.
					Shortleaf pine------	68	106	
					Southern red oak----	72	54	
					White oak-----------	71	53	
					Yellow-poplar-------	80	71	
					Black oak-----------	---	---	
					Scarlet oak---------	---	---	
					Hickory-------------	---	---	
					Virginia pine-------	---	---	
DoB---------- Dogue	7W	Slight	Moderate	Slight	Southern red oak----	80	62	Loblolly pine, eastern white pine, hardwoods 1/.
					Yellow-poplar-------	93	95	
					White oak-----------	80	62	
					Sycamore------------	---	---	
					Virginia pine-------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
EaE, EaF---------- Evard	11R	Moderate	Moderate	Moderate	Shortleaf pine------	74	118	Eastern white pine, hardwoods 1/.
					Virginia pine-------	80	122	
					Eastern white pine--	86	157	
					Yellow-poplar-------	90	90	
					White oak----------	71	53	
					Sweet birch---------	---	---	
					Red maple----------	---	---	
					Scarlet oak---------	---	---	
					Black oak----------	---	---	
					Chestnut oak--------	---	---	
					Fraser Magnolia-----	---	---	
ESF:								
Evard----------	11R	Moderate	Moderate	Moderate	Shortleaf pine------	74	118	Eastern white pine, hardwoods 1/.
					Virginia pine-------	80	122	
					Eastern white pine--	86	157	
					Yellow-poplar-------	90	90	
					Fraser magnolia-----	---	---	
Saluda----------	11R	Moderate	Moderate	Moderate	Shortleaf pine------	57	82	Loblolly pine, Virginia pine, eastern white pine, hardwoods 1/.
					Eastern white pine--	85	155	
					Pitch pine----------	68	106	
					Virginia pine-------	70	109	
					Yellow-poplar-------	82	75	
HaD---------- Hayesville	11A	Slight	Slight	Slight	Yellow-poplar-------	91	92	Shortleaf pine, eastern white pine, Fraser fir 2/, hardwoods 1/.
					Eastern white pine--	86	157	
					Northern red oak----	70	52	
					Pitch pine----------	70	110	
					Shortleaf pine------	69	108	
					Virginia pine-------	74	114	
					White oak----------	---	---	
					Hickory------------	---	---	
					Scarlet oak---------	---	---	
					Black oak----------	---	---	
					Chestnut oak--------	---	---	
					Fraser magnolia-----	---	---	
HaE---------- Hayesville	11A	Moderate	Moderate	Moderate	Yellow-poplar-------	80	71	Shortleaf pine, eastern white pine, Fraser fir 2/, hardwoods 1/.
					Eastern white pine--	86	157	
					Northern red oak----	70	52	
					Pitch pine----------	70	110	
					Shortleaf pine------	69	108	
					Virginia pine-------	74	114	
					White oak----------	---	---	
					Hickory------------	---	---	
					Scarlet oak---------	---	---	
					Black oak----------	---	---	
					Chestnut oak--------	---	---	
					Fraser magnolia-----	---	---	
HbD---------- Hibriten	6R	Slight	Moderate	Moderate	Eastern white pine--	---	---	Eastern white pine, hardwoods 1/.
					Virginia pine-------	61	95	
					Scarlet oak---------	---	---	
					White oak----------	---	---	
					Chestnut oak--------	54	38	
					Pitch pine----------	57	82	
					Black oak----------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
HbF---------- Hibriten	6R	Moderate	Severe	Moderate	Eastern white pine--	---	---	Eastern white pine, hardwoods 1/.
					Virginia pine-------	61	95	
					Scarlet oak---------	---	---	
					White oak-----------	---	---	
					Chestnut oak--------	54	38	
					Pitch pine----------	57	82	
					Black oak-----------	---	---	
MaB, MaD---------- Masada	10A	Slight	Slight	Slight	Southern red oak----	70	52	Eastern white pine, loblolly pine, hardwoods 1/.
					Virginia pine-------	70	109	
					Shortleaf pine------	70	110	
					Yellow-poplar-------	85	81	
					Eastern white pine--	80	144	
					White oak-----------	---	---	
					Hickory-------------	---	---	
PaE, PaF---------- Pacolet	7R	Moderate	Moderate	Slight	Shortleaf pine------	67	103	Loblolly pine, eastern white pine, loblolly pine, hardwoods 1/.
					Yellow-poplar-------	80	71	
					Virginia pine-------	70	109	
					Southern red oak----	70	110	
					Scarlet oak---------	85	81	
					Post oak------------	80	144	
					White oak-----------	---	---	
					Hickory-------------	---	---	
RnE, RnF---------- Rion	12R	Moderate	Moderate	Moderate	Shortleaf pine------	70	110	Loblolly pine, eastern white pine, shortleaf pine, hardwoods 1/.
					Southern red oak----	80	62	
					White oak-----------	70	52	
					Yellow-poplar-------	90	90	
					Eastern white pine--	92	170	
					Post oak------------	65	65	
					Virginia pine-------	---	---	
					Scarlet oak---------	---	---	
Ro---------- Roanoke	8W	Slight	Severe	Severe	Virginia pine-------	76	117	Loblolly pine, eastern white pine, hardwoods 1/.
					Willow oak----------	76	58	
					Yellow-poplar-------	90	90	
					White oak-----------	---	---	
					American beach------	---	---	
RSF: Rock outcrop.								
Ashe----------	11X	Severe	Severe	Severe	Chestnut oak--------	---	---	Eastern white pine.
					Scarlet oak---------	---	---	
					Yellow-poplar-------	78	68	
					Eastern white pine--	84	153	
					Northern red oak----	---	---	
					Pitch pine----------	---	---	
					Shortleaf pine------	56	80	
					Virginia pine-------	62	95	
					Blackjack oak-------	---	---	
SeB---------- State	9A	Slight	Slight	Slight	Southern red oak----	85	67	Black walnut, loblolly pine, eastern white pine, hardwoods 1/.
					Yellow-poplar-------	100	107	
					Virginia pine-------	85	127	
					Eastern hemlock-----			
					Red maple-----------			
					Black locust--------			

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
TaB---------- Tate	12A	Slight	Slight	Slight	Shortleaf pine------	75	120	Fraser fir 2/, Norway spruce 2/, shortleaf pine, eastern white pine, black walnut, hardwoods 1/.
					Eastern white pine--	90	166	
					Northern red oak----	80	62	
					Yellow-poplar-------	95	98	
					Eastern hemlock-----			
					Red maple-----------			
					Black locust--------			
TaE---------- Tate	12R	Moderate	Moderate	Slight	Shortleaf pine------	75	120	Fraser fir 2/, Norway spruce 2/, shortleaf pine, eastern white pine, black walnut, hardwoods 1/.
					Eastern white pine--	90	166	
					Northern red oak----	80	62	
					Yellow-poplar-------	95	98	
					Eastern hemlock-----	---	---	
					Red maple-----------	---	---	
					Black locust--------	---	---	
Wk---------- Wehadkee	7W	Slight	Severe	Severe	Yellow-poplar-------	98	104	Loblolly pine, eastern white pine, hardwoods 1/.
					Willow oak----------	90	72	
					Green ash-----------	96	---	
					White ash-----------	88	---	
					Water oak-----------	86	86	
					Red maple-----------	---	---	
					River birch---------	---	---	

1/ An even-aged management system is needed for natural regeneration of desirable hardwood species.
2/ Christmas tree species, nursery stock, or both.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ApB---- Appling	Slight----	Slight----	Moderate: slope.	Slight----	Slight.
ApD---- Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: slope.
AsF, AsG---- Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bn---- Buncombe	Severe: flooding.	Moderate: flooding, too sandy.	Severe: flooding.	Moderate: flooding, too sandy.	Severe: flooding, droughty.
BtF---- Burton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
CeB2---- Cecil	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Slight.
CeD2---- Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Slight.
CfB2: Cecil----	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Slight.
Urban land.					
CfD2: Cecil----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Slight.
Urban.					
ChG---- Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CKE: Chestnut----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Edneyville----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CKF: Chestnut----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Edneyville----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cm---- Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Co---------- Congaree	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
DnB---------- Davidson	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
DnD---------- Davidson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
DoB---------- Dogue	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.
EaE---------- Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EaF---------- Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ESF: Evard----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Saluda----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, thin layer.
HaD---------- Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
HaE---------- Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HbD---------- Hibriten	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: large stones.	Severe: small stones.
HbF---------- Hibriten	Severe: small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: large stones, slope.	Severe: slope, small stones.
MaB---------- Masada	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
MaD---------- Masada	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
PaE---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaF---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Po---------- Potomac	Severe: flooding.	Moderate: large stones, small stones, too sandy.	Severe: large stones, small stones.	Moderate: too sandy.	Moderate: large stones, droughty, flooding.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pt. Pits					
RnE---------- Rion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RnF---------- Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ro---------- Roanoke	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
RSF: Rock outcrop.					
Ashe---------- 	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SeB---------- State	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TaB---------- Tate	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TaE---------- Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UaB: Urban land. Arents.					
UmC: Urban land. Masada----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Wk---------- Wehadkee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ApB---------- Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ApD---------- Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AsF, AsG---------- Ashe	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bn---------- Buncombe	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
BtF---------- Burton	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CeB2, CeD2--------- Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfB2: Cecil----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
CfD2: Cecil----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban.										
ChG---------- Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CKE: Chestnut----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Edneyville--------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CKF: Chestnut----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Edneyville--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cm---------- Chewacla	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Co---------- Congaree	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DnB---------- Davidson	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Poor.
DnD---------- Davidson	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
DoB---------- Dogue	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EaE---------- Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EaF---------- Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ESF:										
Evard----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Saluda----------	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
HaD---------- Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaE---------- Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HbD---------- Hibriten	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
HbF---------- Hibriten	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
MaB---------- Masada	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaD---------- Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaE, PaF---------- Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Po---------- Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Pt. Pits										
RnE---------- Rion	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RnF---------- Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ro---------- Roanoke	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
RSF: Rock outcrop.										
Ashe----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
SeB---------- State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
TaB---------- Tate	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaE---------- Tate	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
UaB: Urban land.										
Arents.										
UmC: Urban land.										
Masada----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wk---------- Wehadkee	Very poor.	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.

TABLE 9.--WILDLIFE AND WILDLIFE HABITAT BY SPECIES

[Provided by the local North Carolina Wildlife Resources Commission]

Species	Population rating			Existing habitat			Habitat trend rating			Habitat potential		
	Good	Fair	Poor	Good	Fair	Poor	Up	Down	Same	Good	Fair	Poor
Bear		x			x				x		x	
Deer, white-tailed	x			x				x		x		
Rabbits, cottontail		x			x			x			x	
Squirrels	x			x					x	x		
Fox, red and gray		x		x					x	x		
Bobwhite		x			x			x			x	
Dove, mourning		x			x			x			x	
Ducks		x			x				x		x	
Herons		x			x				x		x	
Grouse, ruffed		x			x				x		x	
Turkey			x		x				x		x	
Songbirds	x			x					x	x		
Raptors, (owls, hawks)		x		x					x	x		
Woodpeckers	x			x					x	x		
FURBEARERS:												
Mink			x		x				x			x
Muskrat		x			x				x		x	
Raccoon		x			x			x			x	
Beaver			x		x				x		x	
Bobcat		x			x				x	x		
FISHERIES:												
Cold-water		x			x				x	x		
Warm-water		x			x				x		x	

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ApB--- Appling	Moderate: too clayey.	Slight---	Slight---	Moderate: slope.	Moderate: low strength.	Slight.
ApD--- Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
AsF, AsG--- Ashe	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Bn--- Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, droughty.
BtF--- Burton	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
CeB2--- Cecil	Moderate: too clayey.	Slight---	Slight---	Moderate: slope.	Moderate: low strength.	Slight.
CeD2--- Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Slight.
CfB2: Cecil---	Moderate: too clayey.	Slight---	Slight---	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
CfD2: Cecil---	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Slight.
Urban.						
ChG--- Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CKE, CKF: Chestnut---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Edneyville---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cm--- Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Co--- Congaree	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DnB---------- Davidson	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
DnD---------- Davidson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
DoB---------- Dogue	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: wetness.
EaE, EaF---------- Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ESF:						
Evard----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Saluda----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
HaD---------- Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
HaE---------- Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HbD---------- Hibriten	Severe: depth to rock.	Moderate: large stones, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: large stones, slope, depth to rock.	Severe: small stones.
HbF---------- Hibriten	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
MaB---------- Masada	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
MaD---------- Masada	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
PaE, PaF---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Po---------- Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones, droughty, flooding.
Pt. Pits						
RnE, RnF---------- Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ro---------- Roanoke	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
RSF: Rock outcrop.						
Ashe----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
SeB---------- State	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
TaB---------- Tate	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
TaE---------- Tate	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UaB: Urban land.						
Arents.						
UmC: Urban land.						
Masada----------	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Wk---------- Wehadkee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ApB Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: thin layer.
ApD Appling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: thin layer.
AsF, AsG Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope, thin layer.
Bn Buncombe	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
BtF Burton	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, large stones, slope.
CeB2 Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeD2 Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
CfB2: Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
CfD2: Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Urban.					
ChG Chestnut	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, depth to rock, slope.	Poor: area reclaim, small stones, slope.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CKE, CKF: Chestnut	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, depth to rock, slope.	Poor: area reclaim, small stones, slope.
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope.
Cm Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Co Congaree	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
DnB Davidson	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
DnD Davidson	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
DoB Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
EaE, EaF Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
ESF: Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Saluda	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
HaD Hayesville	Moderate: percs slowly, slope.	Severe: slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
HaE Hayesville	Severe: slope.	Severe: slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
HbD Hibriten	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
HbF Hibriten	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MaB---------- Masada	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
MaD---------- Masada	Moderate: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
PaE, PaF---------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Po---------- Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
Pt. Pits					
RnE, RnF---------- Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Ro---------- Roanoke	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RSF: Rock outcrop.					
Ashe----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope, thin layer.
SeB---------- State	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
TaB---------- Tate	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Good.
TaE---------- Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
UaB: Urban land. Arents.					
UmC: Urban land.					
Masada----------	Moderate: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Wk---------- Wehadkee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ApB---- Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
ApD---- Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
AsF, AsG---- Ashe	Poor: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Bn---- Buncombe	Good----	Probable----	Improbable: too sandy.	Fair: too sandy.
BtF---- Burton	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
CeB2, CeD2---- Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CfB2: Cecil----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land.				
CfD2: Cecil----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban.				
ChG---- Chestnut	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CKE: Chestnut----	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Edneyville----	Fair: thin layer, slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
CKF: Chestnut----	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Edneyville----	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Cm---- Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Co Congaree	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
DnB, DnD Davidson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
DoB Dogue	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
EaE Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EaF Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ESF: Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Saluda	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
HaD Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
HaE Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
HbD Hibriten	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
HbF Hibriten	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
MaB, MaD Masada	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
PaE Pacolet	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
PaF Pacolet	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Po Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
Pt. Pits				
RnE Rion	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
RnF---------- Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ro---------- Roanoke	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
RSF: Rock outcrop.				
Ashe----------	Poor: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
SeB---------- State	Good----------	Probable----------	Improbable: too sandy.	Good.
TaB---------- Tate	Good----------	Improbable: excess fines.	Improbable: excess fines.	Moderate: thin layer.
TaE---------- Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
UaB: Urban land.				
Arents.				
UmC: Urban land.				
Masada----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Wk---------- Wehadkee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
ApB---------- Appling	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
ApD---------- Appling	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
AsF, AsG---------- Ashe	Severe: seepage, slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope.
Bn---------- Buncombe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty, rooting depth.
BtF---------- Burton	Severe: seepage, slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
CeB2---------- Cecil	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
CeD2---------- Cecil	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
CfB2: Cecil----------	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
Urban land.						
CfD2: Cecil----------	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
Urban.						
ChG---------- Chestnut	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock, slope.	Large stones, depth to rock, slope.
CKE, CKF: Chestnut---------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Depth to rock, slope, large stones.
Edneyville-------	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Cm---------- Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Moderate: slow refill.	Flooding-------	Wetness--------	Wetness.
Co---------- Congaree	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding-------	Erodes easily, wetness, soil blowing.	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
DnB---------- Davidson	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
DnD---------- Davidson	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
DoB---------- Dogue	Moderate: seepage, slope.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Slope----------	Wetness, soil blowing.	Favorable.
EaE, EaF---------- Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope.
ESF: Evard----------	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope.
Saluda----------	Severe: depth to rock, slope.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Slope, depth to rock, soil blowing.	Slope, depth to rock.
HaD---------- Hayesville	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
HaE---------- Hayesville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
HbD---------- Hibriten	Severe: slope.	Moderate: seepage, large stones, piping.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, depth to rock, large stones.
HbF---------- Hibriten	Severe: slope.	Moderate: seepage, large stones, piping.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, depth to rock, large stones.
MaB---------- Masada	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable------	Favorable.
MaD---------- Masada	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
PaE, PaF---------- Pacolet	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
Po---------- Potomac	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Large stones, too sandy.	Large stones, droughty.
Pt. Pits						
RnE, RnF---------- Rion	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, droughty.
Ro---------- Roanoke	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
RSF: Rock outcrop.						
Ashe	Severe: seepage, slope.	Moderate: piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope.
SeB State	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Favorable.
TaB Tate	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
TaE Tate	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
UaB: Urban land.						
Arents.						
UmC: Urban land.						
Masada	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Wk Wehadkee	Moderate: seepage.	Severe: wetness.	Slight	Flooding	Wetness	Wetness.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in additions to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ApB	0-9	Sandy loam	SM, SM-SC	A-2	0-5	86-100	80-100	55-91	15-35	<27	NP-5
Appling	9-37	Sandy clay, clay loam, clay.	MH, ML	A-7	0-5	95-100	95-100	70-95	51-80	41-74	15-30
	37-58	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	58-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
ApD	0-9	Sandy loam	SM, SM-SC	A-2	0-5	86-100	80-100	55-91	15-35	<27	NP-5
Appling	9-33	Sandy clay, clay loam, clay.	MH, ML	A-7	0-5	95-100	95-100	70-95	51-80	41-74	15-30
	33-43	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	43-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
AsF	0-7	Stony sandy loam	SM, SM-SC	A-2, A-4	15-35	80-90	75-90	65-90	30-49	<25	NP-7
Ashe	7-17	Loam, gravelly sandy loam, sandy loam.	SM, SM-SC	A-4	5-30	85-100	80-95	60-95	36-49	<25	NP-7
	17-36	Gravelly sandy loam, loam, sandy loam.	SM	A-2, A-4	15-30	75-95	70-95	55-95	30-49	---	NP
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
AsG	0-4	Stony sandy loam	SM, SM-SC	A-2, A-4	15-35	80-90	75-90	65-90	30-49	<25	NP-7
Ashe	4-22	Loam, gravelly sandy loam, sandy loam.	SM, SM-SC	A-4	5-30	85-100	80-95	60-95	36-49	<25	NP-7
	22-30	Gravelly sandy loam, loam, sandy loam.	SM	A-2, A-4	15-30	75-95	70-95	55-95	30-49	---	NP
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bn	0-10	Loamy sand	SM, SP-SM	A-2, A-3	0	98-100	98-100	90-97	7-32	---	NP
Buncombe	10-80	Loamy sand, sand, loam.	SM, SP-SM	A-2, A-3	0	98-100	98-100	98-100	7-32	---	NP
BtF	0-10	Stony loam	SM, SM-SC	A-2, A-4	15-35	85-100	75-95	60-90	25-49	<20	NP-7
Burton	10-30	Loam, fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4	15-35	80-95	70-90	55-80	20-45	<20	NP-7
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeB2	0-6	Sandy loam	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
Cecil	6-52	Clay	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	52-64	Variable	---	---	---	---	---	---	---	---	---
CeD2	0-4	Sandy loam	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
Cecil	4-40	Clay	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	40-62	Variable	---	---	---	---	---	---	---	---	---
CfB2:											
Cecil	0-6	Sandy loam	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	6-52	Clay	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	52-64	Variable	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CfB2:											
Urban land.											
CfD2:											
Cecil----------	0-4	Sandy loam-------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	4-40	Clay-------------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	40-62	Variable---------	---	---	---	---	---	---	---	---	---
Urban.											
ChG----------	0-6	Gravelly loam----	SM, SM-SC	A-2, A-4	5-30	75-95	65-90	60-85	36-49	<25	NP-7
Chestnut	6-30	Gravelly loam, gravelly fine sandy loam, cobbly loam.	SM, SM-SC	A-2, A-4	5-30	75-95	65-90	60-85	36-49	<25	NP-7
	30-72	Weathered bedrock	---	---	---	---	---	---	---	---	---
	72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CKE:											
Chestnut--------	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0-5	85-100	80-95	60-95	36-55	<25	NP-7
	7-37	Gravelly loam, gravelly fine sandy loam, cobbly loam.	SM, SM-SC	A-2, A-4	5-30	75-95	65-90	60-85	36-49	<25	NP-7
	37-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
	72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Edneyville------	0-4	Sandy loam-------	SM, SM-SC	A-4, A-2	0-5	85-100	80-100	65-80	30-50	<30	NP-7
	4-30	Fine sandy loam, loam, sandy loam.	SM, SM-SC	A-4, A-6	0-15	85-100	80-100	65-90	36-50	25-42	6-15
	30-60	Variable---------	---	---	---	---	---	---	---	---	---
CKF:											
Chestnut--------	0-6	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-4	0-5	85-100	80-95	60-95	36-55	<25	NP-7
	6-30	Gravelly loam, gravelly fine sandy loam, cobbly loam.	SM, SM-SC	A-4	5-30	75-95	65-90	60-85	36-49	<25	NP-7
	30-72	Weathered bedrock	---	---	---	---	---	---	---	---	---
	72	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Edneyville------	0-7	Loam-------------	ML, CL-ML, CL, MH	A-4, A-5	0-5	85-100	80-100	70-90	51-65	<58	NP-10
	7-38	Fine sandy loam, loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-4, A-6	0-15	80-100	80-100	55-90	36-60	25-42	6-15
	38-62	Variable---------	---	---	---	---	---	---	---	---	---
Cm----------	0-8	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
Chewacla	8-44	Sandy clay loam, loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-4, A-7-6	0	96-100	95-100	60-96	36-70	<45	NP-15
	44-72	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Co---------- Congaree	0-9	Fine sandy loam	SM, SM-SC	A-2, A-4	0	95-100	95-100	70-100	20-50	<30	NP-7
	9-40	Silty clay loam, fine sandy loam, loam.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	70-100	40-90	25-50	3-22
	40-84	Variable---------	---	---	---	---	---	---	---	---	---
DnB---------- Davidson	0-8	Clay loam--------	CL, SC, CL-ML, SM-SC	A-6, A-4	0	94-100	84-100	75-95	40-70	25-40	5-18
	8-72	Clay----------	CL, CH, ML, MH	A-7, A-6	0	96-100	95-100	85-100	65-85	35-65	12-33
DnD---------- Davidson	0-8	Clay loam--------	CL, SC, CL-ML, SM-SC	A-6, A-4	0	94-100	84-100	75-95	40-70	25-40	5-18
	8-72	Clay----------	CL, CH, ML, MH	A-7, A-6	0	96-100	95-100	85-100	65-85	35-65	12-33
	72-85	Clay, clay loam, sandy clay loam.	CL, ML, MH	A-4, A-6, A-7	0	95-100	90-100	75-100	50-85	20-65	7-30
DoB---------- Dogue	0-8	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0	95-100	75-100	50-100	20-50	<25	NP-10
	8-42	Clay loam, clay, sandy clay loam.	CL, CH, SC	A-6, A-7	0	95-100	75-100	65-100	40-90	35-60	16-40
	42-60	Stratified sand to sandy clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1	0	80-100	60-100	35-100	10-40	<30	NP-10
EaE---------- Evard	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-33	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	33-60	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
EaF---------- Evard	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-34	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	34-80	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
ESF:											
Evard----------	0-6	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	6-44	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	44-80	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Saluda----------	0-6	Fine sandy loam	SM, SM-SC	A-2, A-4	0-3	90-100	85-98	60-70	25-45	<30	NP-7
	6-18	Sandy loam, sandy clay loam, clay loam.	SM, SM-SC, SC	A-2, A-4, A-6	0-2	90-100	85-98	60-85	30-50	20-38	3-15
	18-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
HaD---------- Hayesville	0-7	Fine sandy loam	SM, SC, ML, CL	A-4	0	90-100	85-95	70-95	36-60	<30	NP-10
	7-55	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0	90-100	85-100	70-100	55-80	36-66	11-35
	55-64	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	<28	NP-12

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HaE---------- Hayesville	0-6	Fine sandy loam	SM, SC, ML, CL	A-4	0	90-100	85-95	70-95	36-60	<30	NP-10
	6-50	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0	90-100	85-100	70-100	55-80	36-66	11-35
	50-60	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	<28	NP-12
HbD---------- Hibriten	0-8	Very cobbly sandy loam.	GM, GP-GM, SP-SM, SM	A-2, A-1	0-30	40-75	35-65	20-45	10-30	<35	NP-10
	8-12	Very cobbly fine sandy loam, very cobbly sandy loam, very cobbly sandy clay loam.	GM, GC, SM, SC	A-2, A-1	0-30	50-85	35-80	20-50	10-35	<35	NP-18
	12-24	Very cobbly clay loam, sandy clay loam.	GC, SM	A-2, A-2-4	0-30	60-90	50-85	40-65	20-60	<35	NP-18
	24-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HbF---------- Hibriten	0-7	Very cobbly sandy loam.	GM, GP-GM, SM	A-2, A-1	0-30	40-75	35-65	20-45	10-30	<35	NP-10
	7-13	Very cobbly fine sandy loam, very cobbly sandy loam, very cobbly sandy clay loam.	GM, GC, SM, SC	A-2, A-1	0-30	50-85	35-80	20-50	10-35	<35	NP-18
	13-22	Very cobbly clay loam, sandy clay loam.	GC, SM	A-2, A-2-4	0-30	60-90	50-85	40-65	20-60	<35	NP-18
	22-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaB---------- Masada	0-10	Loam----------	ML, SM, SC, CL	A-4, A-6	0-5	90-100	75-100	60-100	36-75	<30	NP-8
	10-58	Clay loam, clay, gravelly clay.	MH, ML, CH, CL	A-7, A-6	0-10	80-100	70-100	65-90	50-80	45-65	20-35
	58-72	Clay loam, gravelly clay loam.	CL	A-6, A-7	0-10	80-100	70-100	65-90	50-80	30-45	15-25
MaD---------- Masada	0-5	Loam----------	ML, SM, SC, CL	A-4, A-6	0-5	90-100	75-100	60-100	36-75	<30	NP-15
	5-54	Clay loam, clay, gravelly clay.	MH, ML, CH, CL	A-7, A-6	0-10	80-100	70-100	65-90	50-80	35-65	15-35
	54-60	Clay loam, gravelly clay loam.	CL, ML	A-6, A-7	0-10	80-100	70-100	65-95	50-80	30-45	7-20
PaE---------- Pacolet	0-7	Fine sandy loam	SM, SM-SC	A-2, A-1-B	0-2	85-100	80-100	42-80	16-35	<28	NP-7
	7-40	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	40-60	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
PaF---------- Pacolet	0-2	Fine sandy loam	SM, SM-SC	A-2, A-1-B	0-2	85-100	80-100	42-80	16-35	<28	NP-7
	2-36	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	36-80	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6
Po---------- Potomac	0-2	Very cobbly loamy sand.	SM, GM, SM-SC, GM-GC	A-2, A-4, A-1	15-40	60-90	50-85	30-75	20-35	<20	NP-5
	2-60	Very cobbly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<16	NP-3
Pt. Pits											
RnE---------- Rion	0-11	Sandy loam-------	SM	A-2, A-4	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	11-37	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	37-68	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SM-SC	A-2, A-4, A-6	0-2	90-100	80-100	60-85	15-50	<36	NP-12
RnF---------- Rion	0-7	Sandy loam-------	SM	A-2, A-4	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	7-32	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	32-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SM-SC	A-2, A-4, A-6	0-2	90-100	80-100	60-85	15-50	<36	NP-12
Ro---------- Roanoke	0-7	Loam----------	SM-SC, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	36-90	20-35	5-16
	7-45	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	45-80	Stratified sandy clay to clay.	CL-ML, GM-GC, CH, ML	A-2, A-4, A-6, A-7	0-5	40-100	35-100	25-95	15-90	<60	NP-40
RSF: Rock outcrop.											
Ashe----------	0-4	Stony sandy loam	SM, SM-SC	A-2, A-4	15-35	80-90	75-90	65-90	30-49	<25	NP-7
	4-22	Loam, sandy loam, fine sandy loam.	SM, SM-SC	A-4	5-30	85-100	80-95	60-95	36-49	<25	NP-7
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SeB---------- State	0-8	Loam----------	SM, SC, ML, CL	A-4, A-6	0	95-100	95-100	65-95	45-85	<28	NP-15
	8-48	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	36-80	24-40	8-22
	48-80	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	0	85-100	75-100	40-90	5-50	<25	NP-7

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TaB, TaE--------- Tate	0-12	Fine sandy loam	CL, ML, SM, SC	A-4, A-6	0-5	96-100	86-98	68-98	40-80	<38	NP-13
	12-48	Clay loam, sandy clay loam, loam.	CL, ML, CL-ML	A-4, A-6	5-15	94-100	87-100	75-99	40-85	20-40	2-12
	48-60	Gravelly fine sandy loam.	GM, GM-GC	A-4, A-2-4	15-35	40-75	40-65	35-60	30-50	<25	NP-7
UaB: Urban land.											
Arents.											
UmC: Urban land.											
Masada-----------	0-10	Loam-------------	ML, SM, SC, CL	A-4	0-5	90-100	75-100	60-100	36-75	<30	NP-8
	10-58	Clay loam, clay, gravelly clay.	MH, ML, CH, CL	A-7, A-6	0-10	80-100	70-100	65-90	50-80	35-65	15-35
	58-72	Clay loam, gravelly clay loam.	CL, ML	A-6, A-7	0-10	80-100	70-100	65-95	50-80	30-45	7-20
Wk--------------- Wehadkee	0-10	Loam-------------	SM, SC, SM-SC	A-2, A-4	0	100	95-100	60-90	30-50	<35	NP-10
	10-37	Loam, sandy clay loam, clay loam.	ML, CL, CL-ML	A-6, A-7, A-4	0	100	99-100	85-100	51-90	25-50	7-25
	37-80	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
ApB	0-9	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.24	4	.5-2
Appling	9-37	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low	0.20		
	37-58	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	58-80	---	---	---	---	---	---	---		
ApD	0-9	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.24	4	.5-2
Appling	9-33	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low	0.20		
	33-43	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	43-60	---	---	---	---	---	---	---		
AsF	0-7	10-25	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low	0.17	2	1-3
Ashe	7-17	10-25	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.17		
	17-36	5-15	1.45-1.65	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.17		
	36	---	---	---	---	---	---	---		
AsG	0-4	10-25	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low	0.17	2	1-3
Ashe	4-22	10-25	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.17		
	22	5-15	1.45-1.65	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.17		
	30	---	---	---	---	---	---	---		
Bn	0-10	3-12	1.60-1.75	>6.0	0.06-0.10	6.1-6.5	Low	0.10	5	.5-1
Buncombe	10-80	3-12	1.60-1.75	>6.0	0.03-0.07	4.5-6.0	Low	0.10		
BtF	0-10	5-25	1.35-1.60	0.6-6.0	0.11-0.16	3.6-6.0	Low	0.15	2	2-5
Burton	10-30	5-25	1.35-1.60	0.6-6.0	0.10-0.15	3.6-6.0	Low	0.15		
	30	---	---	---	---	---	---	---		
CeB2	0-6	5-20	1.00-1.50	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	4	.5-2
Cecil	6-52	40-60	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	52-64	---	---	---	---	---	---	---		
CeD2	0-4	5-20	1.00-1.50	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	4	.5-2
Cecil	4-40	40-60	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	40-62	---	---	---	---	---	---	---		
CfB2:										
Cecil	0-6	5-20	1.00-1.50	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	4	.5-2
	6-52	40-60	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	52-64	---	---	---	---	---	---	---		
Urban land.										
CfD2:										
Cecil	0-4	5-20	1.00-1.50	2.0-6.0	0.12-0.14	4.5-6.0	Low	0.28	4	.5-2
	4-40	40-60	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	40-62	---	---	---	---	---	---	---		
Urban.										
ChG	0-6	10-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.17	3	1-3
Chestnut	6-30	10-25	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.15		
	30-72	---	---	---	---	---	---	---		
	72	---	---	---	---	---	---	---		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
CKE:										
Chestnut	0-7	10-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.24	3	1-3
	7-37	10-25	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.15		
	37-60	---	---	---	---	---	---	---		
	72	---	---	---	---	---	---	---		
Edneyville	0-4	5-25	1.40-1.60	2.0-6.0	0.11-0.17	4.5-6.0	Low	0.24	4	1-3
	4-30	7-20	1.40-1.60	0.6-2.0	0.14-0.16	4.5-6.0	Low	0.20		
	30-60	---	---	---	---	---	---	---		
CKF:										
Chestnut	0-6	10-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.24	3	1-3
	6-30	10-25	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.15		
	30-72	---	---	---	---	---	---	---		
	72	---	---	---	---	---	---	---		
Edneyville	0-7	10-25	1.40-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28	4	1-3
	7-38	7-20	1.40-1.60	0.6-2.0	0.14-0.16	4.5-6.0	Low	0.20		
	38-62	---	---	---	---	---	---	---		
Cm	0-8	10-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	1-4
Chewacla	8-44	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low	0.28		
	44-72	---	---	---	---	---	---	---		
Co	0-9	5-15	1.30-1.60	0.6-6.0	0.12-0.18	4.5-7.3	Low	0.24	5	<4
Congaree	9-40	18-35	1.20-1.50	0.6-2.0	0.12-0.20	4.5-7.3	Low	0.37		
	40-84	---	---	---	---	---	---	---		
DnB	0-8	20-35	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5	.5-2
Davidson	8-72	40-60	1.20-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24		
DnD	0-8	20-35	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5	.5-2
Davidson	8-72	40-60	1.20-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24		
	72-85	25-60	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28		
DoB	0-8	5-10	1.35-1.50	2.0-6.0	0.08-0.15	3.6-5.5	Low	0.28	4	.5-1
Dogue	8-42	35-50	1.45-1.60	0.2-0.6	0.12-0.19	3.6-5.5	Moderate	0.28		
	42-60	5-30	1.30-1.50	0.6-6.0	0.05-0.14	3.6-5.5	Low	0.17		
EaE	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.24	5	<2
Evard	6-33	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	33-60	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.24		
EaF	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.24	5	<2
Evard	6-34	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	34-80	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.24		
ESF:										
Evard	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.24	5	<2
	6-44	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24		
	44-80	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.24		
Saluda	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-5.5	Low	0.20	2	.5-2
	6-18	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.20		
	18-65	---	---	---	---	---	---	---		
HaD	0-7	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.0	Low	0.20	5	1-3
Hayesville	7-55	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.24		
	55-64	5-15	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low	0.17		
HaE	0-6	10-25	1.35-1.60	2.0-6.0	0.12-0.20	4.5-6.0	Low	0.20	5	1-3
Hayesville	6-50	30-50	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.24		
	50-60	5-15	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low	0.17		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
HbD	0-8	5-15	1.20-1.50	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.20	2	.5-2
Hibriten	8-12	10-30	1.20-1.50	0.6-2.0	0.08-0.14	4.5-5.5	Low	0.20		
	12-24	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.20		
	24-48	---	---	---	---	---	---	---		
	48	---	---	---	---	---	---	---		
HbF	0-7	5-15	1.20-1.50	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.20	2	.5-2
Hibriten	7-13	10-30	1.20-1.50	0.6-2.0	0.08-0.14	4.5-5.5	Low	0.20		
	13-22	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.20		
	22-48	---	---	---	---	---	---	---		
	48	---	---	---	---	---	---	---		
MaB	0-10	10-27	1.20-1.50	2.0-6.0	0.10-0.17	4.5-5.5	Low	0.32	4	1-3
Masada	10-58	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate	0.24		
	58-72	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate	0.24		
MaD	0-5	10-27	1.20-1.50	2.0-6.0	0.10-0.17	4.5-5.5	Low	0.32	4	1-3
Masada	5-54	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate	0.24		
	54-60	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate	0.24		
PaE	0-7	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low	0.20	3	.5-2
Pacolet	7-40	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	40-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
PaF	0-2	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low	0.20	3	.5-2
Pacolet	2-36	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	36-80	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
Po	0-2	5-12	1.20-1.50	2.0-6.0	0.08-0.12	5.1-7.8	Low	0.20	3	0-2
Potomac	2-60	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low	0.17		
Pt.										
Pits										
RnE	0-11	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low	0.24	3	.5-2
Rion	11-37	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low	0.20		
	37-68	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low	0.20		
RnF	0-7	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low	0.24	3	.5-2
Rion	7-32	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low	0.20		
	32-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low	0.20		
Ro	0-7	10-27	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	Low	0.37	4	.5-2
Roanoke	7-45	35-60	1.35-1.65	0.06-0.2	0.10-0.19	3.6-5.5	Moderate	0.24		
	45-80	5-50	1.20-1.50	0.06-20	0.04-0.14	3.6-6.5	Moderate	0.24		
RSF:										
Rock outcrop.										
Ashe	0-4	10-25	1.35-1.60	2.0-6.0	0.13-0.18	4.5-6.0	Low	0.24	2	1-3
	4-22	10-25	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.17		
	22	---	---	---	---	---	---	---		
SeB	0-8	10-18	1.20-1.35	0.6-2.0	0.12-0.17	4.5-5.5	Low	0.38	5	<2
State	8-48	18-34	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low	0.28		
	48-80	2-15	1.35-1.50	>2.0	0.02-0.10	4.5-6.0	Low	0.17		
TaB, TaE	0-12	5-25	1.35-1.60	2.0-6.0	0.17-0.19	5.1-6	Low	0.24	4	1-3
Tate	12-48	10-35	1.30-1.45	0.6-2.0	0.17-0.19	5.1-6	Low	0.28		
	48-60	5-15	1.45-1.65	2.0-6.0	0.08-0.14	5.1-5.5	Low	0.17		
UaB:										
Urban land.										

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
UaB:										
Arents.										
UmC:										
Urban land.										
Masada----------	0-10	10-27	1.20-1.50	2.0-6.0	0.10-0.17	4.5-5.5	Low----------	0.32	4	1-3
	10-58	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24		
	58-72	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24		
Wk----------	0-10	5-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	5	2-5
Wehadkee	10-37	18-35	1.30-1.50	0.6-2.0	0.16-0.20	4.5-6.5	Low----------	0.32		
	37-80	---	---	---	---	---	----------	----		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
ApB, ApD---------- Appling	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
AsF, AsG---------- Ashe	B	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
Bn---------- Buncombe	A	Frequent----	Very brief	Feb-Jun	>6.0	---	---	>60	---	Low------	Moderate.
BtF---------- Burton	B	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
CeB2, CeD2-------- Cecil	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CfB2: Cecil----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban land.											
CfD2: Cecil----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban.											
ChG---------- Chestnut	B	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
CKE, CKF: Chestnut---------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
Edneyville-------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High.
Cm---------- Chewacla	C	Occasional	Brief-----	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High-----	Moderate.
Co---------- Congaree	B	Occasional	Brief-----	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate.
DnB, DnD---------- Davidson	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
DoB---------- Dogue	C	Rare--------	---	---	1.5-3.0	Apparent	Jan-Mar	>60	---	High-----	High.
EaE, EaF---------- Evard	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
ESF: Evard----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Saluda----------	C	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	High.
HaD, HaE---------- Hayesville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
HbD, HbF---------- Hibriten	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
MaB, MaD---------- Masada	C	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
PaE, PaF---------- Pacolet	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
Po---------- Potomac	A	Frequent----	Brief-----	Feb-Jun	4.0-6.0	Apparent	---	>60	---	Low------	Moderate.
Pt. Pits											
RnE, RnF---------- Rion	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High.
Ro---------- Roanoke	D	None--------	---	---	0-1.0	Apparent	Nov-May	>60	---	High-----	High.
RSF: Rock outcrop.											
Ashe----------	B	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
SeB---------- State	B	None--------	---	---	4.0-6.0	Apparent	Dec-Jun	>60	---	Moderate	High.
TaB, TaE---------- Tate	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
UaB: Urban land.											
Arents.											
UmC: Urban land.											
Masada----------	C	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
Wk---------- Wehadkee	D	Frequent----	Brief-----	Nov-Jun	0-2.5	Apparent	Dec-May	>60	---	High-----	Moderate.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth (in inches)	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
	AASHTO	Unified	Percentage smaller than--				Percentage smaller than--					Maximum dry density	Optimum moisture
			No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
										Pct		Lb/ft^3	Pct
Chewacla loam: 1/ (S80NC-027-1)													
Ap - - - - - 0-8	A-6(7)	ML	100	100	97	65	47	24	14	40	12	97.3	22.6
Bw2 - - - - - 18-34	A-7-6(9)	ML	100	99	96	65	50	32	24	43	15	99.8	21.9
2Cg - - - - - 52-72	A-1-b(0)	SP-SM	95	78	44	12	8	5	4	---	NP	120.9	12.1
Edneyville loam: 1/ (S80NC-027-2)													
A2 - - - - - 3-7	A-5(9)	MH	96	90	83	65	47	18	9	58	10	73.8	37.0
Bw - - - - - 11-28	A-6(5)	ML	84	80	72	56	45	26	17	40	12	102.5	20.0
C - - - - - 38-62	A-4(0)	ML	100	98	94	73	16	2	1	---	NP	95.2	24.0
Hibriten very cobbly sandy loam: 1/ (S80NC-027-5)													
A2 - - - - - 2-8	A-1-a(0)	GM	43	38	26	15	11	6	4	34	5	105.3	14.0
BA - - - - - 8-12	A-2-4(0)	SM	84	76	47	26	20	12	8	30	6	118.5	13.0
Bt - - - - - 12-22	A-2-4(0)	SM	89	85	46	24	19	13	10	32	7	116.3	13.5
Masada loam: 1/ (S80NC-027-3)													
Ap - - - - - 0-10	A-4(5)	CL	100	99	97	73	45	29	19	29	9	107.8	16.9
Bt2 - - - - - 26-42	A-6(12)	CL	99	97	95	77	58	47	39	40	16	105.6	19.8
C - - - - - 58-72	A-6(4)	CL	99	98	93	51	37	26	21	36	12	107.7	17.6
Rion sandy loam: 1/ 2/ (S80NC-027-4)													
A2 and BA - - - - - 2-10	A-4(0)	SM	96	92	72	41	27	14	7	35	6	103.4	18.0
Bt - - - - - 10-24	A-4(2)	CL	100	98	83	50	34	21	14	33	10	110.3	16.6
C - - - - - 32-60	A-4(0)	SM	99	97	81	38	21	15	12	36	7	110.9	15.8

1/ Sample site is same as that of the series typical pedon given in "Soil Series and Their Morphology."

2/ The clay content in the control section as shown in this table is slightly less than is allowed for the series; however, particle-size data for this same pedon as determined by North Carolina State University indicates a clay content of 23 percent, which is within the range of the series.

TABLE 18.--CLASSIFICATION OF THE SOILS

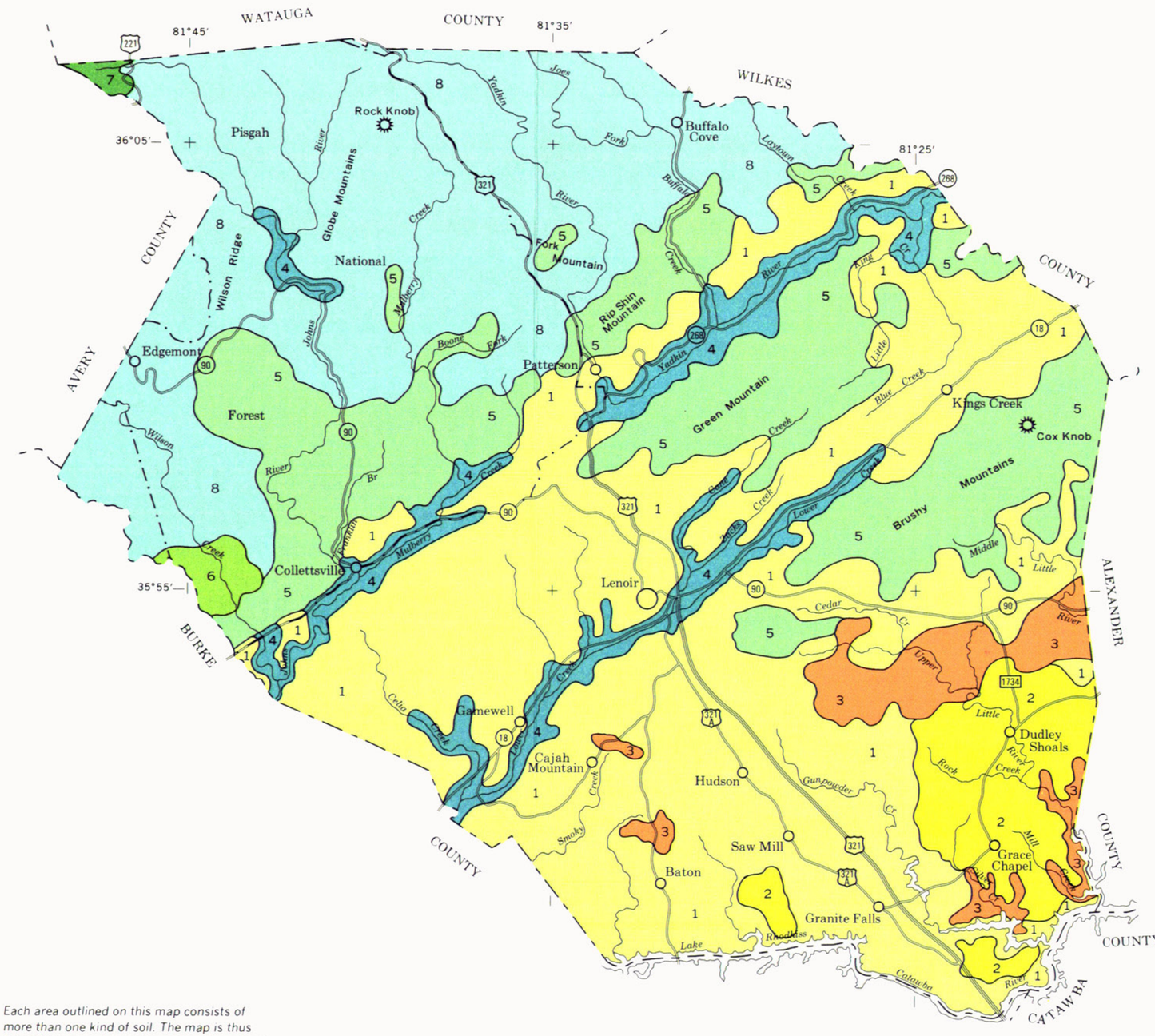
Soil name	Family or higher taxonomic class
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Buncombe	Mixed, thermic Typic Udipsamments
Burton	Coarse-loamy, mixed, frigid Typic Haplumbrepts
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Davidson	Clayey, kaolinitic, thermic Rhodic Paleudults
Dogue	Clayey, mixed, thermic Aquic Hapludults
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Hayesville	Clayey, oxidic, mesic Typic Hapludults
Hibriten	Loamy-skeletal, mixed, thermic Ochreptic Hapludults
Masada	Clayey, mixed, thermic Typic Hapludults
Pacolet	Clayey, kaolinitic, thermic Typic Hapludults
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Saluda	Loamy, mixed, mesic, shallow Typic Hapludults
State	Fine-loamy, mixed, thermic Typic Hapludults
Tate	Fine-loamy, mixed, mesic Typic Hapludults
Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents

☆ U.S. GOVERNMENT PRINTING OFFICE : 1989 O - 205-508 : QL 3

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



LEGEND

1	CECIL-PACOLET-RION: Gently sloping to steep, well drained soils that have a clayey or loamy subsoil; formed in residuum from igneous and metamorphic rock
2	CECIL-PACOLET-APPLING: Gently sloping to steep, well drained soils that have a clayey subsoil; formed in residuum from igneous and metamorphic rock
3	HIBRITEN-PACOLET: Moderately sloping to very steep, well drained soils that have a loamy or clayey subsoil; formed in residuum from metamorphic and igneous rock
4	CHEWACLA-MASADA-CONGAREE: Nearly level to strongly sloping, somewhat poorly drained to well drained soils that have a loamy or clayey subsoil or loamy underlying material; formed in recent or old alluvium
5	EVARD-HAYESVILLE-SALUDA: Moderately sloping to very steep, well drained soils that have a clayey or loamy subsoil; formed in residuum from metamorphic rock
6	ASHE: Steep or very steep, somewhat excessively drained soils that have a loamy subsoil; formed in residuum from granite gneiss
7	BURTON: Steep, well drained soils that have a loamy subsoil; formed in residuum from quartzite
8	CHESTNUT-EDNEYVILLE: Moderately steep to very steep, well drained soils that have a loamy subsoil; formed in residuum from metamorphic rock

COMPILED 1987

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE
NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE
CALDWELL COUNTY BOARD OF COMMISSIONERS

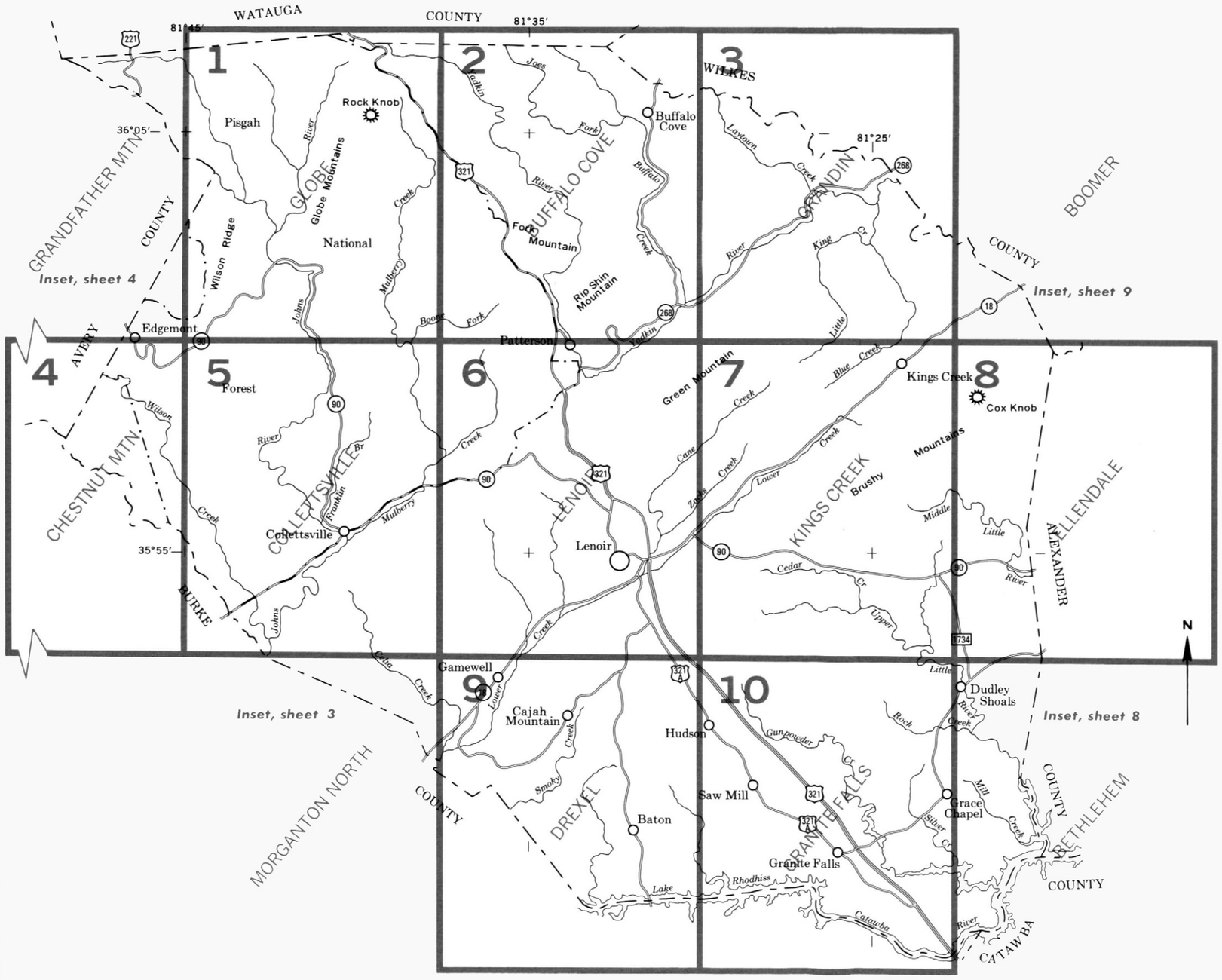
GENERAL SOIL MAP

CALDWELL COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



INDEX TO MAP SHEETS

CALDWELL COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

CALDWELL COUNTY, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
NORTH CAROLINA AGRICULTURAL RESEARCH SERVICE
NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE
CALDWELL COUNTY BOARD OF COMMISSIONERS

SOIL LEGEND

Soil map symbols and map unit names are alphabetical. The first letter, always a capital, is the initial letter of the soil series name or miscellaneous area. The second letter is a small letter except in broadly defined map units that have all capital letters and are further indicated by 1/. The third letter, where used, is always a capital letter and denotes slope. Symbols with only two letters indicate nearly level soils or miscellaneous areas.

SYMBOL	NAME
ApB	Appling sandy loam, 2 to 8 percent slopes
ApD	Appling sandy loam, 8 to 15 percent slopes
AsF	Ashe stony sandy loam, 25 to 40 percent slopes
AsG	Ashe stony sandy loam, 40 to 80 percent slopes
Bn	Buncombe loamy sand, frequently flooded
BtF	Burton stony loam, 25 to 40 percent slopes
CeB2	Cecil sandy loam, 2 to 8 percent slopes, eroded
CeD2	Cecil sandy loam, 8 to 15 percent slopes, eroded
CfB2	Cecil-Urban land complex, 2 to 8 percent slopes, eroded
CfD2	Cecil-Urban land complex, 8 to 15 percent slopes, eroded
ChG	Chestnut gravelly loam, 50 to 80 percent slopes
CkE	Chestnut and Edneyville soils, 15 to 25 percent slopes 1/
CkF	Chestnut and Edneyville soils, 25 to 50 percent slopes 1/
Cm	Chewacla loam, occasionally flooded
Co	Congaree fine sandy loam, occasionally flooded
DnB	Davidson clay loam, 2 to 8 percent slopes
DnD	Davidson clay loam, 8 to 15 percent slopes
DoB	Dogue fine sandy loam, 2 to 8 percent slopes
EaE	Evard fine sandy loam, 15 to 25 percent slopes
EaF	Evard fine sandy loam, 25 to 50 percent slopes
ESF	Evard and Saluda fine sandy loams, 25 to 60 percent slopes 1/
HaD	Hayesville fine sandy loam, 8 to 15 percent slopes
HaE	Hayesville fine sandy loam, 15 to 25 percent slopes
HbD	Hibriten very cobbly sandy loam, 8 to 15 percent slopes
HbF	Hibriten very cobbly sandy loam, 15 to 60 percent slopes
MaB	Masada loam, 2 to 8 percent slopes
MaD	Masada loam, 8 to 15 percent slopes
PaE	Pacolet fine sandy loam, 15 to 25 percent slopes
PaF	Pacolet fine sandy loam, 25 to 40 percent slopes
Po	Potomac very cobbly loamy sand, frequently flooded
Pt	Pits, Quarries
RnE	Rion sandy loam, 15 to 25 percent slopes
RnF	Rion sandy loam, 25 to 40 percent slopes
Ro	Roanoke loam
RSF	Rock outcrop-Ashe complex, 25 to 80 percent slopes 1/
SeB	State loam, 2 to 8 percent slopes
TaB	Tate fine sandy loam, 2 to 10 percent slopes
TaE	Tate fine sandy loam, 8 to 25 percent slopes
UaB	Urban land-Arents complex, occasionally flooded
UmC	Urban land-Masada complex, 2 to 15 percent slopes
Wk	Wehadkee loam, frequently flooded

1/ These map units are mapped more broadly than others in the survey area, but mapping has been controlled well enough to be interpreted for the expected use of the soils.

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small

PITS

- Gravel pit
- Mine or quarry — Small areas (<5 acres) where stone or gravel has been removed.

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot — Small areas (<3 acres) of soils that are poorly drained to very poorly drained and two drainage classes wetter than the soil in the surrounding area.

SPECIAL SYMBOLS FOR SOIL SURVEY

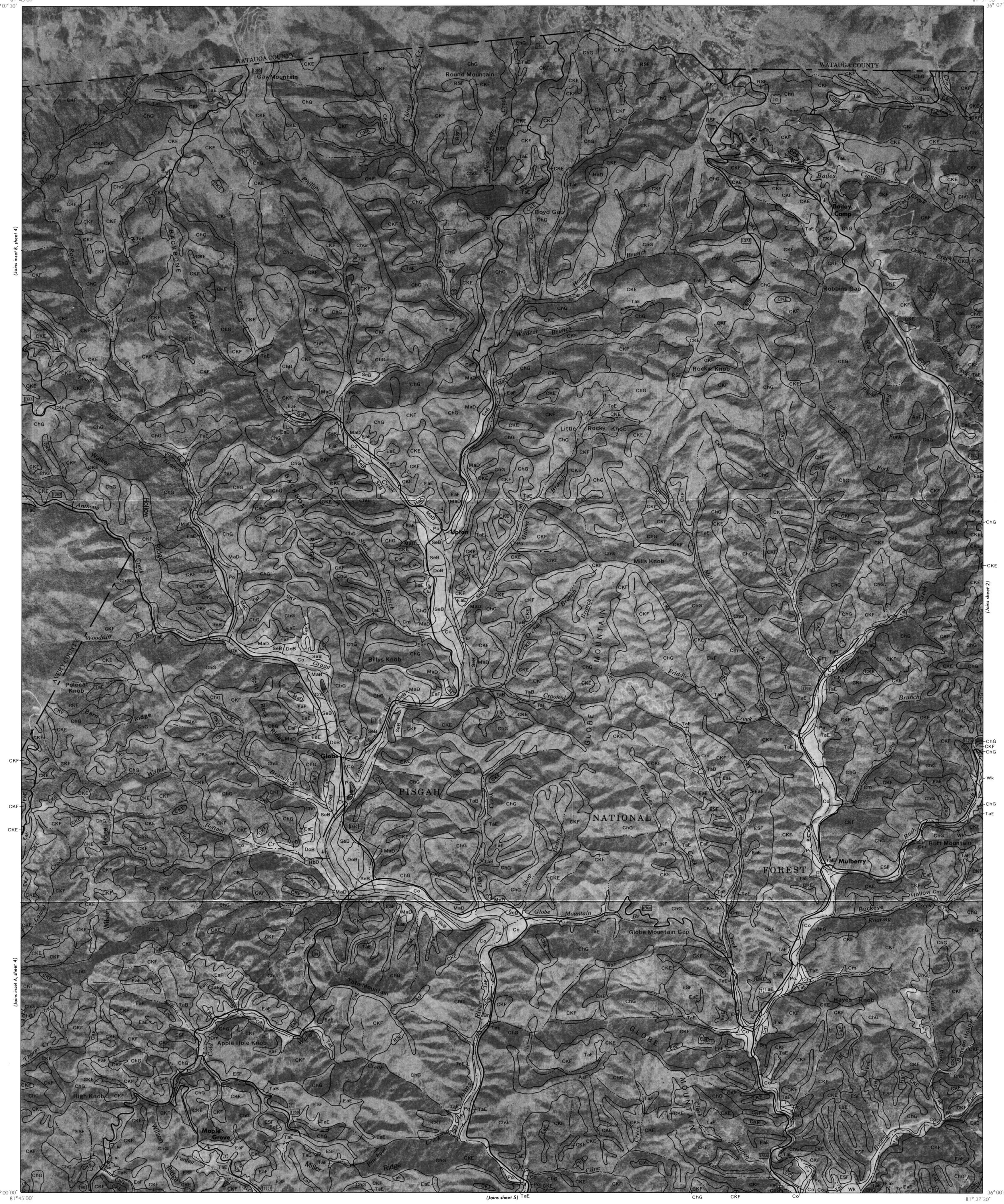
- SOIL DELINEATIONS AND SYMBOLS
- ESCARPMENTS
  - Bedrock (points down slope)
  - Other than bedrock (points down slope)
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot — Small areas (<3 acres) where the soil surface is covered by more than 15 percent stony material.

81°45'00"
36°07'30"

81°37'30"
36°07'30"



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 1

N

SHEET NO. 1 OF 10

81°37'30"
36°07'30"

81°30'00"
36°07'30"

WATAUGA COUNTY

WILKES COUNTY

ROCKHOUSE RIDGE

Pine Knob

Chestnut Knob

Raven Rock Knob

Curtis Knob

Sandy Gap

Richland

Finley

Richland Gap

Harris Gap

Stone Mountain

Buffalo Cove

Grindstone Ridge

Cottrell Knob

Licklog Mountain

Durham Gap

Dogwood Gap

High Eagle

Kirby Gap

Butt Mtn

Jackson Knob

Johnnys Knob

Epperson Knob

Legerwood

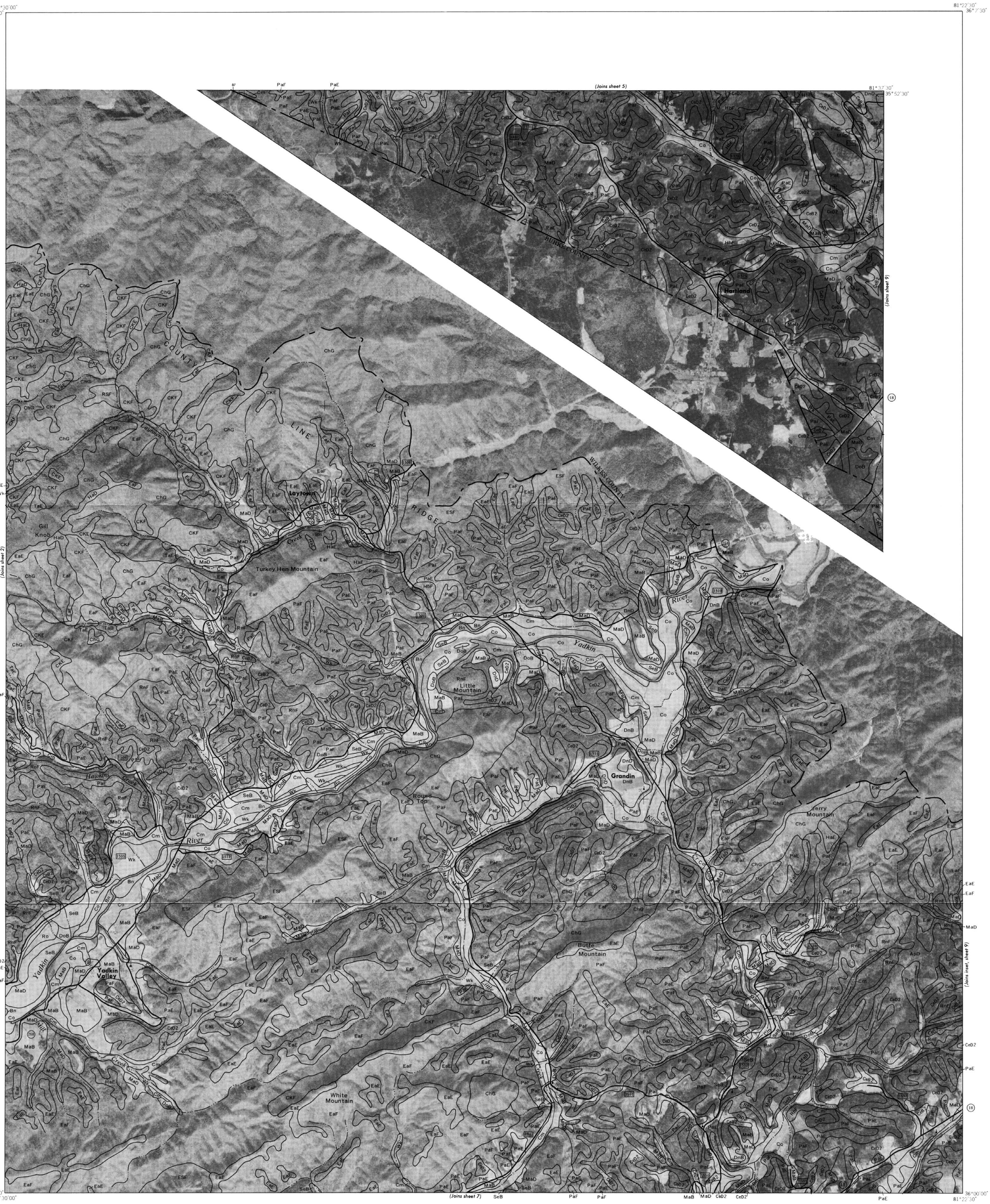
Yadkin Valley

Barrett Mountain

Patterson

RIPSHIN MOUNTAIN

Haunted Cove Creek
Rockhouse Creek
North Fork Joes Creek
Buffalo Creek
Long Ridge
Long Ridge Br
Hickory Flat Br
Dennis Creek
Bailey Camp Creek
Yadkin River
Ooten Creek
Muddy Creek
Mine Branch
Lowder Mill Creek
Moody Cove
Gold Field Branch
Winters Br
Orchard Branch
Jackson Camp Creek Branch
Cook Creek
Army Branch
Puncheon Camp Creek
Greenfield Branch
Rush Creek
Roaring Creek
Red Rock Hollow
Mills Cove
Whetstone Mountain Cove
Deep Cove
Raccoon Cove
Stratton Boone Fork
Tommy Cove
Selzer Cr
Additon Branch
Flat Branch
Wolfpen Cove
Rocky Fork Mountain Creek
Joshua Ridge
Chestnut Orchard Branch
Buckeye Hollow
Carr Mountain
Green Rock Mountain
Coffey Creek
Barnett Branch
Yadkin River
Grassy Mountain
Spring Mountain
Stone Mountain
Cline Mountain
Stairs Mountain Branch
Winding Buffalo Cove
Hawkins Cr
Poplar Branch Cove
Cline Mountain
Laytown Cr
Lickskillet Branch
Yadkin River
Jesse Fork Cr
Poplar Branch
Cove Branch
Cove Branch
Cline Mountain
Hawkins Cr
Yadkin River
Yadkin River
Yadkin River



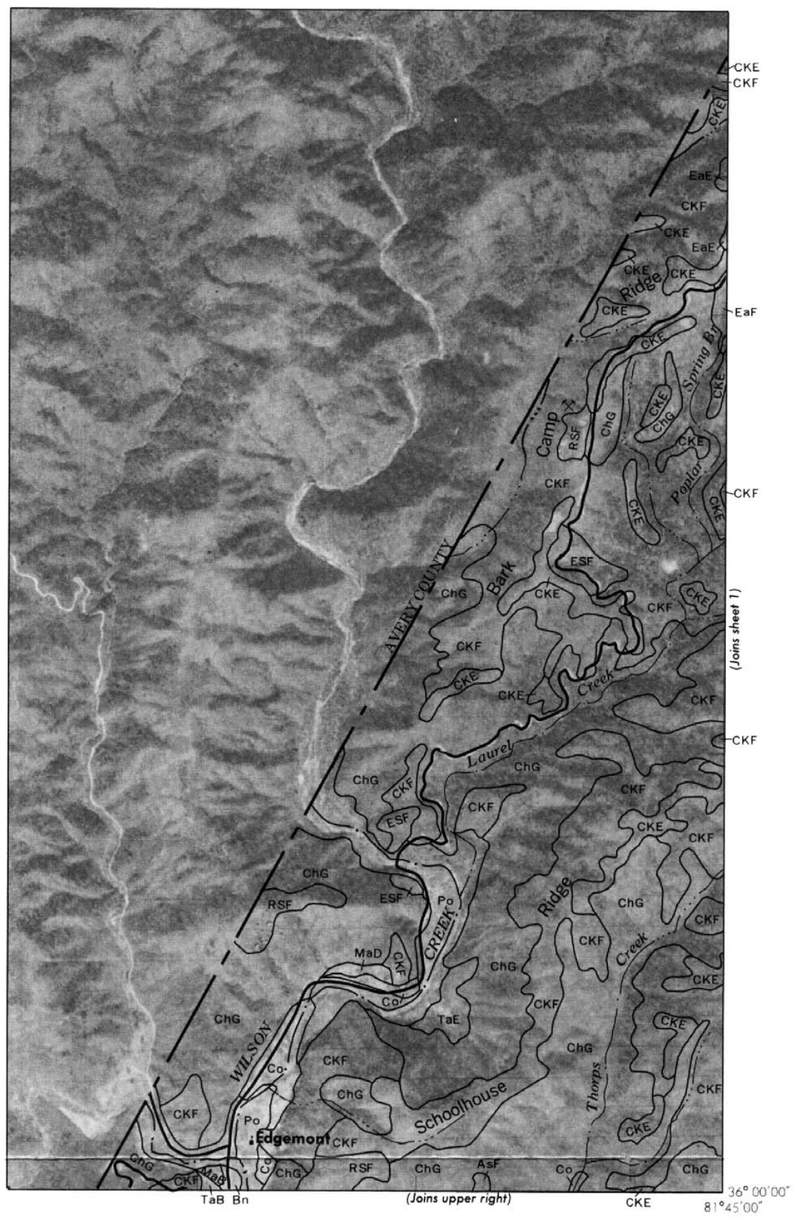
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

CALDWELL COUNTY, NORTH CAROLINA NO. 3

INSET A



INSET B

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 4

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 5

N

81°37'30" 36°00'00" — 81°30'00" 36°00'00"

(Joins sheet 2)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 6

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

CALDWELL COUNTY, NORTH CAROLINA NO. 7

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 8

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 9

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CALDWELL COUNTY, NORTH CAROLINA NO. 10

N